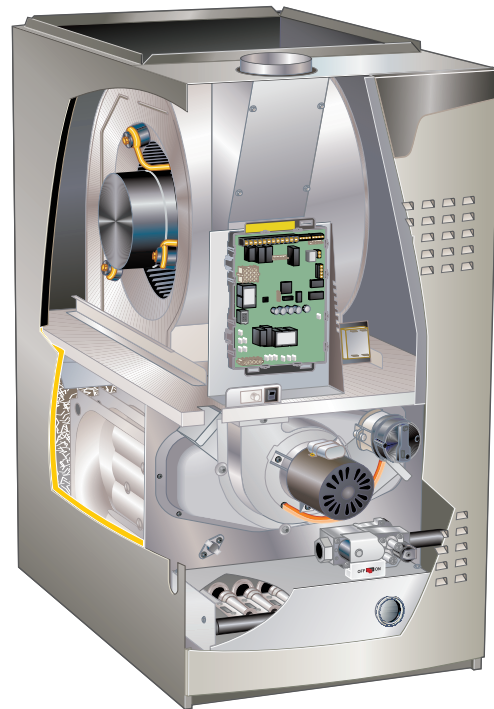


COMMUNICATING ENABLED SL280DFV SERIES UNITS

SL280DFV series units are 80% efficiency gas furnaces used for downflow applications only, manufactured with Lennox Duralok heat exchangers formed of aluminized steel. Units are available in heating capacities of 66,000 to 110,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. SL280DFV model units are equipped with a communicating enabled SureLight® two-stage variable speed integrated control. All units use a redundant gas valve to assure safety shut-off as required by CSA.

All specifications in this manual are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes. In the absence of local or state codes, the guidelines and procedures outlined in this manual (except where noted) are recommendations only and do not constitute code.



⚠ CAUTION
As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

⚠ WARNING
Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer (or equivalent), service agency or the gas supplier.

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⚠ WARNING
Shock hazard. Disconnect power before servicing. Integrated control is not field repairable. If control is inoperable, simply replace entire control. Can cause injury or death. Unsafe operation will result if repair is attempted.



SPECIFICATIONS

Gas	Model No.	SL280DF070V36A	SL280DF090V48B	SL280DF090V60C	SL280DF110V60C
Heating Performance	¹ AFUE	80%	80%	80%	80%
High Fire	Input - Btuh	66,000	88,000	88,000	110,000
	Output - Btuh	52,000	69,000	70,000	87,000
	Temperature rise range - °F	35-65	35-65	35-65	35-65
	Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
Low Fire	Input - Btuh	43,000	57,000	57,000	72,000
	Output - Btuh	35,000	46,000	46,000	59,000
	Temperature rise range - °F	25-55	25-55	25-55	25-55
	Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	1.7 / 4.5	1.7 / 4.5	1.7 / 4.5	1.7 / 4.5
High static - in. w.g.	Heating	0.8	0.8	0.8	0.8
	Cooling	1.0	1.0	1.0	1.0
Connections in.	Flue connection - in. round	4	4	4	4
	Gas pipe size IPS	1/2	1/2	1/2	1/2
Indoor Blower	Wheel nominal diameter x width - in.	10 x 8	11 x 9	11 x 10	11 x 10
	Motor output - hp	1/2	1	1	1
	Tons of add-on cooling	2 - 3	3 - 4	3.5 - 5	3.5 - 5
	Air Volume Range - cfm	589 - 1514	830 - 1996	899 - 2273	882 - 2120
Electrical Data	Voltage	120 volts - 60 hertz - 1 phase			
	Blower motor full load amps	7.7	12.8	12.8	12.8
	Maximum overcurrent protection	15	20	20	20
Shipping Data	lbs. - 1 package	130	153	164	173

NOTE - Filters and provisions for mounting are not furnished and must be field provided.

¹ Annual Fuel Utilization Efficiency based on DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

OPTIONAL ACCESSORIES - ORDER SEPARATELY

NOTE - FURNACES CANNOT BE TWINNED!

	"A" Width Models	"B" Width Models	"C" Width Models
CABINET ACCESSORIES			
Downflow Combustible Flooring Base	11M59	11M60	11M61
CONTROLS			
iComfort® S30 Ultra-Smart Wi-Fi Thermostat	19V30	19V30	19V30
² Remote Outdoor Air Temperature Sensor	X2658	X2658	X2658
¹ Discharge Air Temperature Sensor	88K38	88K38	88K38
DOWNFLOW FILTER KITS			
³ Downflow Filter Cabinet	51W06	51W07	51W08
No. and Size of filter - in.	(1) 20 x 20 x 1	(2) 16 x 20 x 1	(2) 16 x 20 x 1
NIGHT SERVICE KIT			
Night Service Kit	16S36	16S36	16S36

¹ Remote Outdoor Air Temperature Sensor is used with conventional (non-iComfort® Communicating) outdoor units (sensor is furnished with iComfort® Communicating outdoor units). Allows the thermostat to display outdoor temperature. Required in dual-fuel and EDA applications.

² Optional for service diagnostics.

³ Cleanable polyurethane, frame-type filter.

BLOWER DATA

SL280DF070V36A BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1065	1170
+18%	1010	1115
+12%	960	1055
+6%	910	1000
Factory Default	860	945
-6%	805	885
-12%	755	830
-18%	705	775

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	667	756	872	1010	1015	1101	1241	1427
Factory Default	618	683	778	924	922	1014	1115	1304
-	537	619	691	811	800	900	1024	1169

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 250 cfm.

Lennox iHarmony® Zoning System Applications - Minimum blower speed is 250 cfm.

SL280DF070V36A BLOWER MOTOR WATTS (COOLING)

¹ Cooling Speed DIP Switch Settings	Motor Watts @ Various External Static Pressures - in. wg.																				
	First Stage										Second Stage										
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
+ Setting																					
Cooling Speed	Low	44	62	74	90	103	119	133	148	166	119	144	166	189	212	231	242	267	278	298	323
	Med-Low	46	63	83	96	115	128	144	170	181	138	162	177	212	229	247	270	288	320	342	363
	Med-High	66	81	104	127	144	160	175	195	219	185	210	238	266	293	317	349	374	399	432	448
	High	100	123	138	167	191	211	234	255	271	299	328	354	380	412	434	477	499	528	557	570
Factory Default																					
Cooling Speed	Low	34	53	65	78	90	105	118	129	144	89	111	134	153	178	194	208	229	247	263	273
	Med-Low	38	57	64	85	98	107	133	147	158	104	125	144	166	192	212	230	261	267	295	315
	Med-High	49	72	87	96	122	135	160	176	197	141	167	184	216	237	256	288	304	326	356	383
	High	70	90	109	132	158	172	201	222	231	218	245	276	306	323	357	374	403	444	472	489
- Setting																					
Cooling Speed	Low	31	44	56	67	80	92	100	112	121	69	86	105	124	140	154	176	196	209	220	242
	Med-Low	33	45	60	73	89	104	114	123	144	73	89	111	124	155	175	196	210	224	243	263
	Med-High	40	54	74	86	106	115	134	142	170	108	118	153	170	196	219	227	253	266	286	316
	High	52	74	85	107	128	149	161	181	201	156	181	208	222	253	284	305	333	356	374	398

BLOWER DATA

SL280DF090V48B BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1360	1500
+18%	1285	1415
+12%	1220	1350
+6%	1135	1285
Factory Default	1075	1200
-6%	1030	1110
-12%	960	1050
-18%	890	975

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	740	905	1040	1220	1085	1330	1545	1730
Factory Default	690	820	950	1110	990	1200	1400	1,595
-	610	745	855	1005	895	1075	1270	1460

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 380 cfm.

Lennox iHarmony® Zoning System Applications - Minimum blower speed is 380 cfm.

SL280DF090V48B BLOWER MOTOR WATTS (COOLING)

¹ Cooling Speed DIP Switch Settings	Motor Watts @ Various External Static Pressures - in. wg.																				
	First Stage										Second Stage										
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
+ Setting																					
Cooling Speed	Low	33	59	77	98	122	142	166	192	214	97	129	150	188	217	247	267	302	323	365	394
	Med-Low	64	91	118	139	167	193	215	246	272	156	188	230	269	313	346	377	429	452	491	529
	Med-High	92	119	150	174	209	240	261	292	319	281	304	361	413	455	473	528	552	607	637	673
	High	136	174	200	236	264	305	342	376	399	442	470	538	566	603	636	691	730	775	814	838
Factory Default																					
Cooling Speed	Low	23	50	63	84	104	124	150	168	194	74	103	126	155	183	210	243	264	290	316	349
	Med-Low	45	74	98	114	140	163	192	216	247	120	155	192	223	246	276	314	352	382	412	458
	Med-High	62	93	122	143	173	195	232	260	290	206	236	285	324	369	401	437	483	514	551	590
	High	112	142	168	202	220	253	282	306	346	323	336	400	445	489	523	558	595	643	660	689
- Setting																					
Cooling Speed	Low	17	38	56	72	88	115	132	150	170	51	78	106	129	155	178	207	229	259	289	311
	Med-Low	31	54	76	97	117	142	165	187	209	92	122	147	178	217	244	264	289	322	361	385
	Med-High	51	76	104	125	153	175	202	222	258	135	177	208	233	272	311	349	386	417	452	491
	High	78	107	137	155	184	215	246	268	301	247	282	313	365	398	445	483	521	558	582	620

BLOWER DATA

SL280DF090V60C BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1540	1695
+18%	1465	1615
+12%	1390	1530
+6%	1320	1450
Factory Default	1245	1365
-6%	1170	1285
-12%	1095	1205
-18%	1020	1120

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1125	1250	1400	1590	1585	1770	2000	2275
Factory Default	1020	1135	1285	1445	1420	1610	1845	2,050
-	900	1005	1155	1280	1305	1395	1645	1875

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 450 cfm.

Lennox iHarmony® Zoning System Applications - Minimum blower speed is 450 cfm.

SL280DF090V60C BLOWER MOTOR WATTS (COOLING)

¹ Cooling Speed DIP Switch Settings	Motor Watts @ Various External Static Pressures - in. wg.																				
	First Stage										Second Stage										
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
+ Setting																					
Cooling Speed	Low	81	109	135	154	190	215	243	269	291	197	229	269	314	351	403	424	465	503	542	572
	Med-Low	117	142	175	204	227	252	285	308	340	299	329	388	432	466	495	549	586	645	669	705
	Med-High	143	183	208	247	283	312	352	385	423	451	501	521	587	633	664	705	765	794	848	879
	High	209	246	291	329	370	402	447	490	525	689	720	783	826	890	938	995	1032	1072	1104	1131
Factory Default																					
Cooling Speed	Low	63	92	114	139	162	186	216	242	270	144	183	217	248	286	307	354	386	421	459	498
	Med-Low	82	111	141	159	195	223	247	274	308	211	245	294	331	369	401	445	486	523	559	604
	Med-High	121	148	181	211	241	279	304	331	356	331	366	411	468	497	546	588	629	664	707	748
	High	155	194	216	260	296	334	363	393	434	481	535	574	604	655	714	762	816	851	877	942
- Setting																					
Cooling Speed	Low	53	76	101	121	139	166	184	209	238	117	149	180	203	235	269	294	327	349	387	421
	Med-Low	68	94	120	137	166	193	219	239	266	154	187	219	258	291	319	365	386	424	458	492
	Med-High	88	117	144	169	204	227	251	282	313	225	254	298	355	382	427	459	503	542	580	604
	High	124	156	183	208	239	267	304	326	359	362	395	436	484	520	568	614	643	686	721	746

BLOWER DATA

SL280DF110V60C BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING

¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm	Second Stage Heating Speed - cfm
+24%	1645	1810
+18%	1565	1720
+12%	1485	1635
+6%	1405	1545
Factory Default	1325	1460
-6%	1245	1370
-12%	1170	1285
-18%	1090	1195

COOLING

¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1055	1230	1365	1525	1500	1755	1915	2120
Factory Default	975	1115	1250	1400	1360	1585	1770	1960
-	895	1005	1130	1245	1225	1405	1595	1760

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

First stage HEAT is approximately 91% of the same second stage HEAT.

First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.

Continuous Fan Only speed is selectable at 28% and 38% of the selected second stage cooling speed - minimum 450 cfm.

Lennox iHarmony® Zoning System Applications - Minimum blower speed is 450 cfm.

SL280DF110V60C BLOWER MOTOR WATTS (COOLING)

¹ Cooling Speed DIP Switch Settings	Motor Watts @ Various External Static Pressures - in. wg.																				
	First Stage										Second Stage										
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
+ Setting																					
Cooling Speed	Low	78	101	128	144	172	200	218	244	264	172	196	243	284	321	360	391	428	452	494	528
	Med-Low	108	135	162	192	213	241	269	295	324	268	294	352	376	424	466	505	554	581	604	645
	Med-High	146	180	203	238	271	305	334	358	396	373	424	459	504	529	575	641	680	712	747	810
	High	181	219	254	291	327	365	401	436	479	510	557	596	660	725	763	815	869	922	962	993
Factory Default																					
Cooling Speed	Low	62	87	108	125	148	173	196	222	239	135	165	194	231	267	305	320	346	381	422	457
	Med-Low	87	115	135	158	189	218	236	264	285	195	226	270	311	347	377	421	455	494	530	562
	Med-High	114	140	173	201	224	250	283	312	339	290	335	358	401	450	497	528	565	611	640	677
	High	148	186	207	246	282	307	354	375	410	395	438	484	525	559	608	659	711	745	776	826
- Setting																					
Cooling Speed	Low	47	67	94	108	128	140	172	193	212	106	134	161	191	214	238	259	295	322	349	379
	Med-Low	67	91	114	134	151	180	206	226	247	147	181	210	245	280	312	347	376	404	445	476
	Med-High	94	116	141	167	198	210	242	259	288	207	236	284	320	356	391	421	473	494	535	573
	High	118	146	176	202	222	248	285	313	337	280	315	356	398	444	478	520	559	607	627	669

PARTS IDENTIFICATION

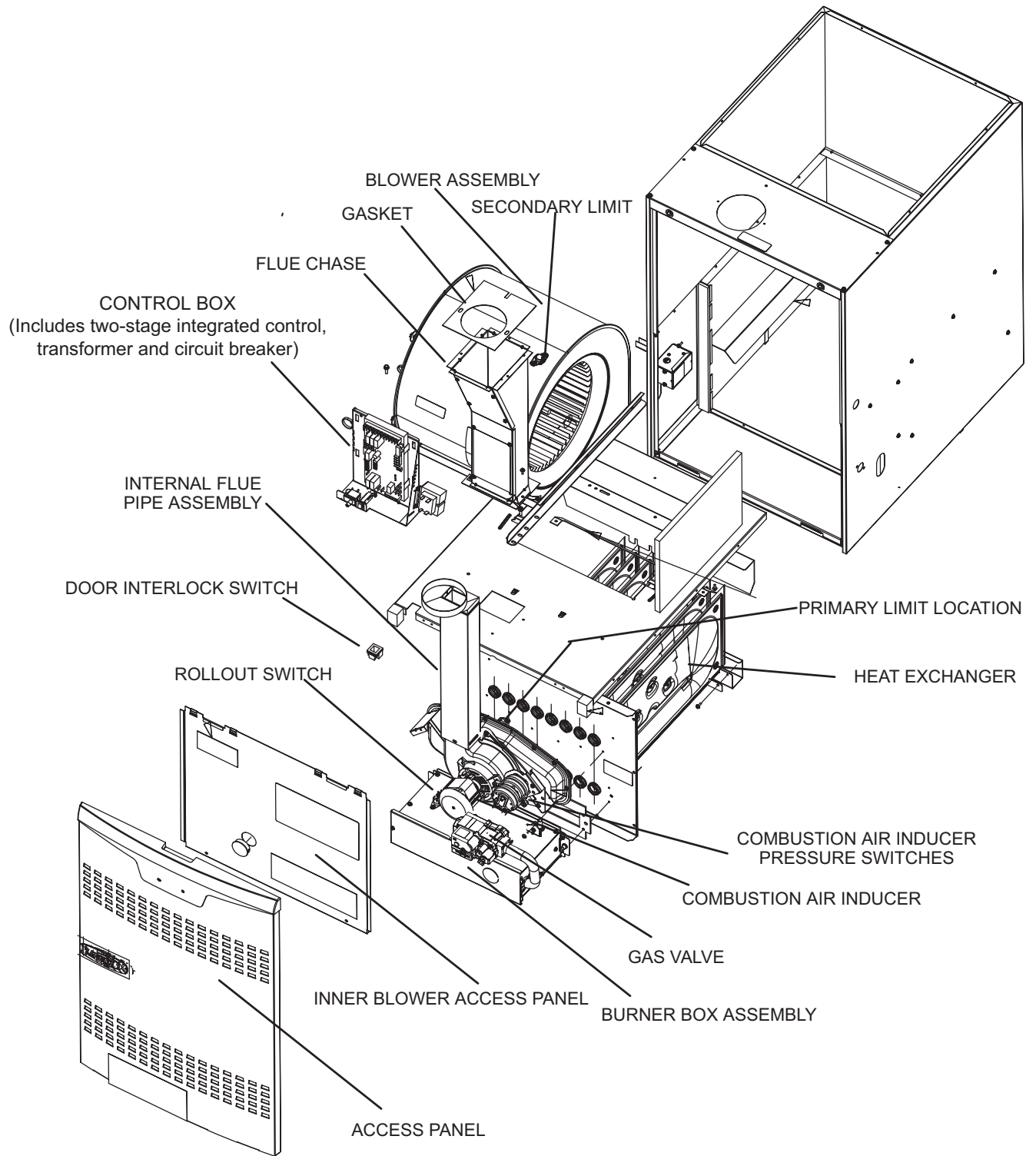


FIGURE 1

I-UNIT COMPONENTS

Unit components are shown in FIGURE 1. The gas valve, combustion air inducer and burners can be accessed by removing the access panel. Electrical components are in the control box (FIGURE 2) found in the blower section.

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures	
⚠ CAUTION	
	Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

A- Control Box

1. Control Transformer (T1)

A transformer located in the control box provides power to the low voltage section of the unit. Transformers on all models are rated 40VA with a 120V primary and a 24V secondary.

2. Door Interlock Switch (S51)

An interlock switch rated 14A at 125VAC is wired in series with line voltage. When the indoor blower access panel is removed the unit will shut down.

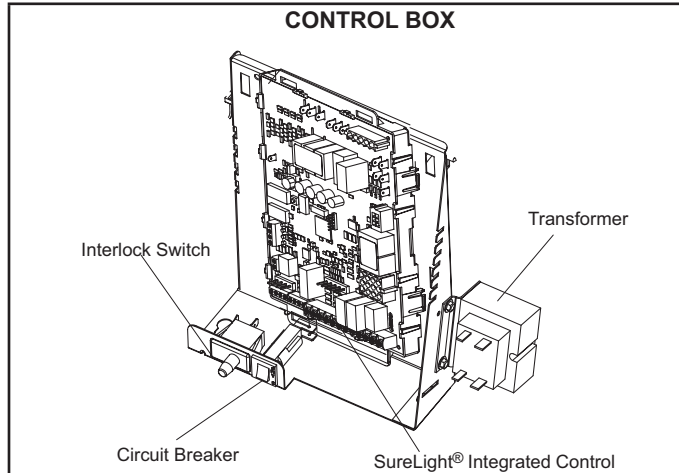


FIGURE 2

3. Circuit Breaker (CB8)

A 24V circuit breaker is also located in the control box. The switch provides overcurrent protection to the transformer (T1). The breaker is rated 3A at 32V. If the current exceeds this limit the breaker will trip and all unit operation will shutdown. The breaker can be manually reset by pressing the button on the face. See FIGURE 3.

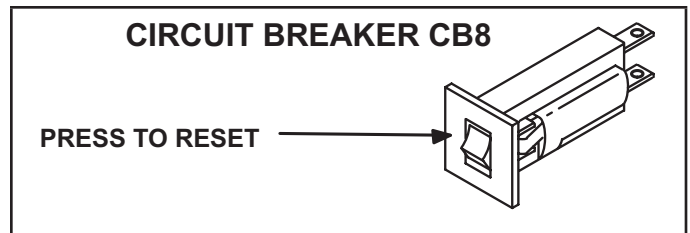


FIGURE 3

⚠ WARNING	
Shock hazard.	
Disconnect power before servicing. Integrated control is not field repairable.	
If control is inoperable, simply replace entire control. Can cause injury or death. Unsafe operation will result if repair is attempted.	

4. SureLight Integrated Control (A92)

Units are equipped with the communicating enabled SureLight[®] two-stage, variable speed integrated control. This control is used with the communicating thermostat as part of a communicating comfort system. The control can also operate with a non-communicating conventional single or two-stage thermostat. The system consists of a ignition / blower control (FIGURE 4 103130-XX and FIGURE 5 107045-XX) with control pin designations in TABLE 1, TABLE 2, TABLE 3 and ignitor (FIGURE 14). The control and ignitor work in combination to ensure furnace ignition and ignitor durability. The control provides gas ignition, safety checks and indoor blower control with two-stage gas heating. The furnace combustion air inducer, gas valve and indoor blower are controlled in response to various system inputs such as thermostat signal, pressure and limit switch signal and flame signal. The control features a seven-segment LED display, indicating furnace status (including indoor blower) and error codes. See table 4 and table 5. The LED flashes in single digits. For example using table 5 under LIMIT CODE, an "E" followed by "2" followed by "5" followed by "0", the limit switch circuit is open. The control also has two unpowered (dry) 1/4" contacts for a humidifier and a 120 volt accessory terminal. Both rated at (1) one amp each.

Electronic Ignition

At the beginning of the heat cycle the integrated control monitors the first stage and second stage combustion air inducer prove switch. The control will not begin the heating cycle if the first stage prove switch is closed (by-passed). Likewise the integrated control will not begin the second stage heating cycle if the second stage prove switch is closed, and will remain in first stage heat. However, if the second stage prove switch closes during the first stage heat pre-purge, the control will allow second stage heat.

Once the first stage prove switch is determined to be open, the combustion air inducer is energized on low (first stage) heat speed. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins.

NOTE - During abnormal conditions such as low supply voltage or low outdoor temperatures and the low fire pressure switch does not close, the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.

After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor energizes during the trial until flame is sensed. If ignition is not proved during the 4-second period, the control will try four more times with an inter purge and warm-up time between trials of 35 seconds.

After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again.

Two Stage Operation / Thermostat Selection DIP Switch

The control can be utilized in two modes: SINGLE-STAGE thermostat or TWO-STAGE thermostat. The thermostat selection is made using a DIP switch and must be positioned for the particular application. DIP switch 1, labeled T^hSTAT HEAT STAGE is factory-set in the OFF position for use with a two-stage thermostat. Move the DIP switch to ON for use with a single stage thermostat.

While in the single-stage thermostat mode, the burners will always fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second stage heat after a “recognition period”. DIP switch 2, labeled SECOND STAGE DELAY, is factory set in the OFF position for a 7 minute recognition period. The switch can be moved to the ON position for a 12 minute recognition period, after which time the unit will switch to secondstage heat.

While in the two-stage thermostat mode (two DIP switch setting) the burners will fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second-stage heat on call from the indoor thermostat. If there is a simultaneous call for first and second stage heat, the unit will fire an first stage heat and switch to second stage heat after 30 seconds of operation. See Sequence of Operation flow charts in the back of this manual for more detail.

TABLE 1

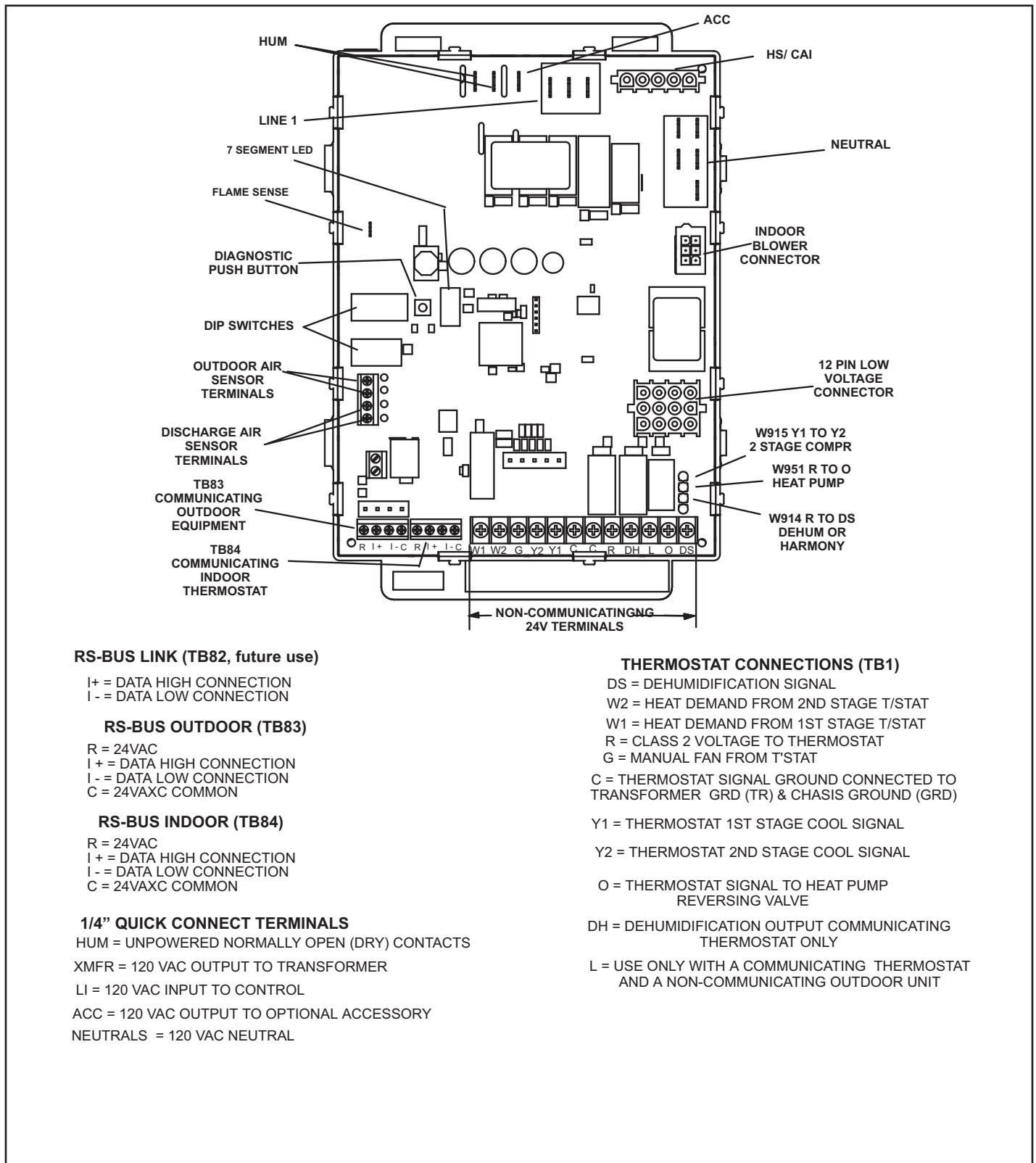
SureLight® Control 5 Pin Terminal Designation	
PIN#	Function
1	Ignitor
2	Combustion Air Inducer High Speed
3	Combustion Air Inducer Low Speed
4	Combustion Air Inducer Neutral
5	Ignitor Neutral

TABLE 2

SureLight® Control 12 Pin Terminal Designation	
PIN#	Function
1	Gas Valve High Fire
2	Second Stage Prove Switch
3	Rollout In
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve Low Stage
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Rollout Switch Out
12	1st Stage Prove Switch

TABLE 3

SureLight® Control 6 Pin Terminal Designation	
PIN#	Function
1	Data Input From Motor
2	Common
3	Not Used
4	Data Output To Motor
5	5 Volt Bias Supply
6	Not Used



RS-BUS LINK (TB82, future use)

I+ = DATA HIGH CONNECTION
I- = DATA LOW CONNECTION

RS-BUS OUTDOOR (TB83)

R = 24VAC
I+ = DATA HIGH CONNECTION
I- = DATA LOW CONNECTION
C = 24VAXC COMMON

RS-BUS INDOOR (TB84)

R = 24VAC
I+ = DATA HIGH CONNECTION
I- = DATA LOW CONNECTION
C = 24VAXC COMMON

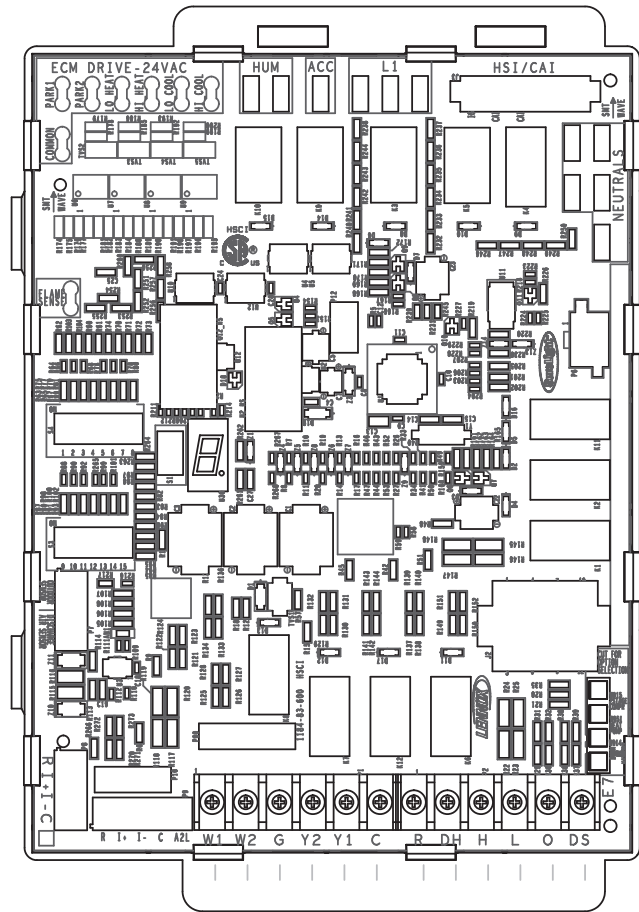
1/4" QUICK CONNECT TERMINALS

HUM = UNPOWERED NORMALLY OPEN (DRY) CONTACTS
XMFR = 120 VAC OUTPUT TO TRANSFORMER
LI = 120 VAC INPUT TO CONTROL
ACC = 120 VAC OUTPUT TO OPTIONAL ACCESSORY
NEUTRALS = 120 VAC NEUTRAL

THERMOSTAT CONNECTIONS (TB1)

DS = DEHUMIDIFICATION SIGNAL
W2 = HEAT DEMAND FROM 2ND STAGE T/STAT
W1 = HEAT DEMAND FROM 1ST STAGE T/STAT
R = CLASS 2 VOLTAGE TO THERMOSTAT
G = MANUAL FAN FROM T'STAT
C = THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GRD (TR) & CHASIS GROUND (GRD)
Y1 = THERMOSTAT 1ST STAGE COOL SIGNAL
Y2 = THERMOSTAT 2ND STAGE COOL SIGNAL
O = THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE
DH = DEHUMIDIFICATION OUTPUT COMMUNICATING THERMOSTAT ONLY
L = USE ONLY WITH A COMMUNICATING THERMOSTAT AND A NON-COMMUNICATING OUTDOOR UNIT

FIGURE 4



RS-BUS LINK (TB82, future use)

- I+ = DATA HIGH CONNECTION
- I- = DATA LOW CONNECTION
- R = 24VAC
- I+ = DATA HIGH CONNECTION
- I- = DATA LOW CONNECTION
- C = 24VAC COMMON (ground)

RS-BUS INDOOR (TB84)

- R = 24VAC
- I+ = DATA HIGH CONNECTION
- I- = DATA LOW CONNECTION
- C = 24VAC COMMON
- A2L=A2L REFRIGERANT

1/4" QUICK CONNECT TERMINALS

- HUM = UNPOWERED NORMALLY OPEN (DRY) CONTACTS
- XMFR = 120 VAC OUTPUT TO TRANSFORMER
- LI = 120 VAC INPUT TO CONTROL
- ACC = 120 VAC OUTPUT TO OPTIONAL ACCESSORY
- NEUTRALS = 120 VAC NEUTRAL

THERMOSTAT CONNECTIONS (TB1)

- DS = DEHUMIDIFICATION SIGNAL
- W2 = HEAT DEMAND FROM 2ND STAGE T/STAT
- W1 = HEAT DEMAND FROM 1ST STAGE T/STAT
- R = CLASS 2 VOLTAGE TO THERMOSTAT
- G = MANUAL FAN FROM T'STAT
- C = THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GRD (TR) & CHASIS GROUND (GRD)
- Y1 = THERMOSTAT 1ST STAGE COOL SIGNAL
- Y2 = THERMOSTAT 2ND STAGE COOL SIGNAL
- O = THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE
- DH = DEHUMIDIFICATION OUTPUT COMMUNICATING THERMOSTAT ONLY
- L = NOT USED
- H = LOW VOLTAGE (24 VAC) HUMIDIFICATION

FIGURE 5

INTEGRATED CONTROL CONFIGURATION GUIDE

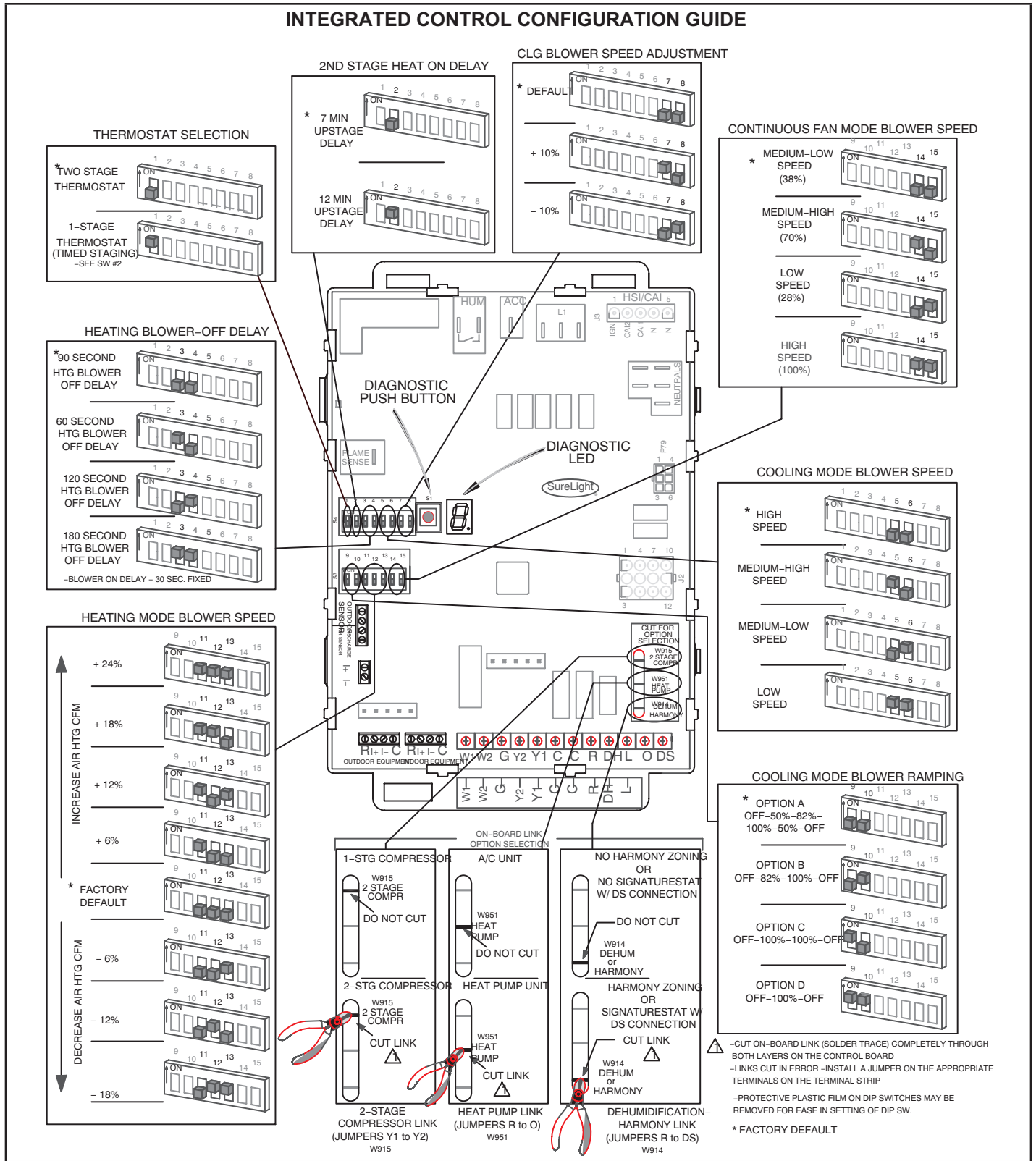


FIGURE 6

Ignition Control 103130-XX Diagnostic Modes

Display	Action (when button is released)
No change (idle)*	Remain in idle mode
Solid "E"	Enter diagnostic recall mode
Solid "D"	Discharge Air Installed
Solid "F"	Enter flame signal mode
Solid "F" (variable speed only)	Program unit capacity size (Unit Code)
Two horizontal lines	soft disable

* No change implies the display will continue to show whatever is currently being displayed for normal operation (blinking decimal, active error code, heat state, etc..)

Diagnostic LED

The seven-segment diagnostic LED displays operating status, target airflow, error codes and other information. The table beginning on the next page lists diagnostic LED codes.

Diagnostic Push Button

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall "E" mode and the Flame Signal "F" mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

Error Code Recall Mode

Select "E" from the menu to access the most recent 10 error codes. Select "c" from the Error Code Recall menu to clear all error codes. Button must be pressed a second time while "c" is flashing to confirm command to delete codes. Press the button until a solid "≡" is displayed to exit the Error Code Recall mode.

Flame Signal Mode

Select "F" from the menu to access the flame signal mode. The integrated control will display the flame current on 7 segment LED in in micro amps (uA).

Flame signal mode is exited after any of the following:

- Power is reset
- Pressing and holding push button until 3 horizontal lines "≡" are displayed
- 10 minutes after entering the flame sense mode.

Program Unit Capacity/Size Mode

After the "P" is selected (by releasing the push button) the integrated control will start flashing the "P" on display for 90 seconds. If push button is pressed again and held during that time, the control will start to display characters corresponding to different variable speed furnace models for 3 seconds each. While the wanted character-model is displayed push button has to be released. Selected option will flash display for 10 seconds and during that time push button has to be pressed and held for 5 seconds. Once control accepts new setting it will store data in non-volatile memory and reset itself. If 10 seconds expires or push button is held less than 5 seconds, control will exit field test mode and go into idle without changing programming the unit size.

Soft Disable

Soft disabling is when thermostat finds a device on the BUS that it does not recognize and the thermostat sends a the device a message to be in soft disabling mode until properly configured. Two horizontal bars will display.

Steps to follow if the damper control module is displaying the soft disable code.

- 1 - Confirm proper wiring between all devices (thermostat, damper control module, indoor and outdoor).
- 2 - Cycle power to the control that is displaying the soft disable code.
- 3 - Put the room thermostat through set up.
- 4 - Go to setup / system devices / thermostat / edit / then push reset.
- 5 - Go to setup / system devices / thermostat / edit / then push reset All.

TABLE 4

Ignition Control 103130-XX Diagnostic Codes

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
.	Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).	
A	Cubic feet per minute (cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed.	
C	Cooling stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes).	
d	Dehumidification mode (1 second ON) / 1 second OFF) / cfm setting displayed / Pause / Repeat Codes).	
h	Heat pump stage (1 second ON, 0.5 second OFF) / % of input rate displayed / Pause / cfm setting / Pause / Repeat codes.	
H	Gas Heat Stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes. Blinking during ignition.	
dF	Defrost mode.	
U	Discharge Air Temperature	
E105	Device communication problem - No other devices on RS BUS (Communication system).	
E110	Low line voltage.	Line Voltage Low (Voltage lower than nameplate rating). Check power line voltage and correct. Alarm clears 5 seconds after fault recovered.
E111	Low line voltage.	Reverse line power voltage wiring. System resumes normal operation 5 seconds after fault recovered.
E112	Ground not detected	System shuts down. Provide proper earth ground. System resumes normal operation 5 seconds after fault recovered.
E113	High line voltage.	Line Voltage High (Voltage higher than nameplate rating). Provide power voltage within proper range. System resumes normal operation 5 seconds after fault recovered.
E114	Line voltage frequency out-of-range.	No 60 Hertz Power. Check voltage and line power frequency. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E115	Low 24V - Control will restart if the error recovers.	24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. May require installation of larger VA transformer to be installed in furnace / air handler. Clears after fault recovered.
E116	High 24V.	24 Volt Power High (Range is 18 to 30 volts). Check and correct voltage. Check for proper line voltage (120V, 240V, etc.) to equipment. Clears when control senses proper voltage.
E117	Poor ground detected (Warning only)	Provide proper grounding for unit. Check for proper earth ground to the system. Warning only will clear 30 seconds after fault recovered.
E120	Unresponsive device. Communication only.	Usually caused by delay in outdoor unit responding to indoor unit polling. Recycle power. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.

Ignition Control 103130-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E124	Active communicating thermostat signal missing for more than 3 minutes.	Equipment lost communication with the thermostat. Check four wiring connections, ohm wires and cycle power at the thermostat. Alert stops all services and waits for heartbeat message from thermostat (subnet controller). Cleared after valid thermostat (subnet controller) message is received.
E125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.).	Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Critical alert. Cleared 300 seconds after fault recovered.
E126	Control internal communication problem.	Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Cleared 300 seconds after fault recovered.
E131	Corrupted control parameters (Verify configuration of system). Communicating only.	Reconfigure the system. Replace control if heating or cooling is not available. Only applicable in the communicating mode, not in startup. Exit from Commissioning and Execute 'Set Factory Default mode Control will still operate on default parameter settings
E180	Outdoor air temperature sensor failure. Only shown if shorted or out-of-range.	Compare outdoor sensor resistance to temperature/ resistance charts in unit installation instructions. Replace sensor pack if necessary. At beginning of (any) configuration, furnace or air handler control will sense outdoor air and discharge air temperature sensor(s). If detected (reading in range), appropriate feature will be set as 'installed' and that could be seen in 'About' screen. In normal operation after control recognizes sensors, alarm will be sent if valid temperature reading is lost. To get rid of setting and alarm, redo configuration and make sure that temperature sensor is marked as 'not installed' in Indoor Unit 'About' screen. When Indoor unit control is replaced, thermostat will 'tell' new control if temperature sensor is in system or not. Clears 30 seconds after fault recovered.
E200	Hard lockout - Rollout circuit open or previously open.	Correct cause of rollout trip, or replace flame rollout switch. Test furnace operation. Cleared after fault recovered.
E201	Indoor blower communication failure - Unable to communicate with blower motor.	Indoor blower communication failure (including power outage). Lost communication with indoor blower motor. Possible causes: motor not powered, loose wiring. Problem may be on control or motor side. Cleared after fault recovered.
E202	Indoor blower motor mis-match - Indoor motor horsepower does not match unit capacity.	Incorrect appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace/Air Handler on configuration guide or in installation instructions. Cleared after the correct match is detected following a reset. (Remove thermostat from system while applying power and reprogramming.)
E203	Appliance capacity / size is NOT programmed. Invalid unit codes refer to configuration flow chart.	No appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace on configuration guide or in installation instructions. Critical Alert. Cleared after valid unit code is read following a reset. (Remove thermostat from system while applying power and reprogramming.)
E204	Gas valve mis-wired.	Check gas valve operation and wiring. Clears when repaired.
E205	Gas valve control relay contact shorted.	Check wiring on control and gas valve. If wiring is correct, replace control.

Ignition Control 103130-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E206	Gas valve second-stage relay failure	Furnace will operate on 1st stage for remainder of the heating demand. Will clear after fault recovered. If unable to operate 2nd stage, replace control.
E207	Hot surface ignitor sensed open.	Measure resistance of hot surface ignitor. Replace if open or not within specified range found in IOM. Resumes normal operation after fault is cleared.
E223	Low pressure switch failed open.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared
E224	Low pressure switch failed closed.	Check operation of low pressure switch to see if it is stuck closed on heat call longer than 150 seconds. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E225	High pressure switch failed open.	Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E226	High pressure switch failed closed	Check operation of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E227	Low pressure switch open during trial for ignition or run mode.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E228	Combustion air inducer calibration failure	Unable to perform pressure switch calibration. Check vent system and pressure switch wiring connections. Resumes normal operation after fault is cleared.
E229	Ignition on high fire	IFC switched to high fire ignition because low fire pressure switch did not close in allowed time. No action is needed.
E240	Low flame current - Run mode.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Alert clears after current heat call has been completed.
E241	Flame sensed out of sequence - Flame still present.	Shut off gas. Check for gas valve leak. Replace, if necessary. Alert clears when fault is recovered.
E250	Limit switch circuit open.	Check for proper firing rate on furnace. Ensure there is no blockage in heater. Check for proper air flow. If limit not closed within 3 minutes, unit will go into 1-hour soft lockout. Resumes normal operation after fault is cleared.
E252	Discharge air temperature too high (gas heat only).	Check temperature rise, air flow and input rate. Cleared when heat call is finished.
E270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.	Check for proper gas flow. Ensure that ignitor is lighting burner. Check flame sensor current. Clears when heat call finishes successfully.

Ignition Control 103130-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E272	Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.	Check operation of low pressure switch to see if it is stuck closed on heat call. Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E273	Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Clears when heat call finishes successfully.
E274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes	Shut down system. 1-hour soft lockout. Check firing rate and air flow. Check for blockage. Clears when heat call finishes successfully.
E275	Soft lockout - Flame sensed out of sequence. Flame signal is gone.	Shut off gas. Check for gas valve leak. 1-hour soft lockout. Clears when flame has been proven stable.
E276	Watchguard calibration failure.	Unable to perform pressure switch calibration. Check vent system and pressure switch wiring connections. 1-hour soft lockout. Clears when calibration has finished successfully.
E290	Ignitor circuit fault - Failed ignitor or triggering circuitry.	Measure resistance of hot surface ignitor. Replace if open or not within specifications. 1-hour soft lockout. Clears when flame has been proven stable.
E291	Heat air flow restricted below the minimum.	Check for dirty filter and air flow restriction. Check blower performance. 1-hour soft lockout. Cleared when heat call finishes successfully.
E292	Indoor blower motor unable to start due to obstructed wheel, seized bearings.	Indoor blower motor unable to start (seized bearing, stuck wheel, etc.). Replace motor or wheel if assembly does not operate or meet performance standards. 1-hour soft lockout. Clears after circulator successfully starts.
E294	Combustion air inducer over current.	Check combustion blower bearings, wiring and amps. Replace if does not operate or does not meet performance standards. Clears after inducer current is sensed to be in-range after the ignition following the soft lockout or reset.
E295	Indoor blower motor temperature is too high.	Indoor blower motor over temperature (motor tripped on internal protector). Check motor bearings and amps. Replace if necessary. Cleared after blower demand is satisfied.
E310	Discharge error temperature sensor failure. Only shown if shorted or out of range.	Compare outdoor sensor resistance to temperature/ resistance charts in installation instructions. Replace sensor if necessary. Cleared in Communicating mode: 30 seconds after fault recovered. In Non-Communicating mode: Cleared after the current heat call is completed.
E311	Heat rate reduced to match indoor blower air flow.	Warning Only. Furnace blower in cutback mode due to restricted airflow. Reduce firing rate every 60 seconds to match available CFM. Check filter and duct system. To clear, replace filter if needed or repair/ add duct. 2-stage controls will reduce firing rate to 1st stage. Clears when heat call finishes successfully.

Ignition Control 103130-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E312	Restricted air flow in cooling or continuous fan mode is lower than cfm setting.	Warning Only. Restricted airflow - Indoor blower is running at a reduced CFM (Cutback Mode - The variable speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating outside of design parameters (0 to 0.8" W.C.. total external static pressure). Check filter and duct system. To clear, replace filter if needed or repair/add duct. Cleared after the current service demand is satisfied.
E313	Indoor or outdoor unit capacity mismatch. Communication only.	Incorrect indoor/outdoor capacity code selected. Check for proper configuring in installation instructions. Alarm is just a warning. The system will operate, but might not meet efficiency and capacity parameters. Alarm will clear when commissioning is exited. Cleared after commissioning is complete.
E331	Global network connection - Communication link problem.	For Future Use.
E334	Relay "Y1" stuck on interated control.	Replace integrated control.
E347	No 24 Volt output on Y1 of "integrated control" with non communicating outdoor unit.	Operation stopped. Y1 relay / Stage 1 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E348	No 24 Volt output on Y2 of "integrated control" with non?communicating outdoor unit.	Y2 relay / Stage 2 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E349	No 24 Volts between R & O on "integrated control" with non communicating outdoor unit (Dual fuel module required for heat pump application	Configuration link R to O needs to be restored. Replace link or hardwire. Applicable in non communicating mode. Critical Alert.
E370	Interlock switch sensed open for 2 minutes.	Control sees the loss of 24VAC for 2 minutes. Terminate all services and wait for interlock switch to close. The alarm will clear when 24VAC is continuously sensed on DS terminal for a minimum of 10 seconds or on a power reset.
E400	LSOM - Compressor internal overload tripped.	Thermostat demand Y1 is present; but, compressor is not running. Check power to outdoor unit. Clears the error after current is sensed in both RUN and START sensors for at least 2 seconds, or after service is removed, or after power reset.
E401	LSOM Compressor long run cycle or low system pressure.	Compressor ran more than 18 hours to satisfy a single thermostat demand. Critical Alert. Clears the error after 30 consecutive normal run cycles or power reset. Also monitors low pressure switch trips.
E402	LSOM - Outdoor unit system pressure trip.	Discharge or suction pressure out-of-limits, or compressor overloaded. Clears the error after 4 consecutive normal compressor run cycles.
E403	LSOM - Compressor short-cycling. (Running less than 4 minutes). Outdoor unit pressure trip	Compressor runs less than 3 minutes to satisfy a thermostat demand. Clears the error after 4 consecutive normal run cycles or power reset.
E404	LSOM - Compressor rotor locked. Compressor short-cycling. (Running less than 4 minutes).	Compressor rotor locked up due to run capacitor short, bearings are seized, excessive liquid refrigerant, etc. Clears the error after 4 consecutive normal run cycles or after power reset.
E405	LSOM - Compressor open circuit.	Compressor circuit open (due to power disconnection, open fuse, etc.) Clears the error after 1 normal compressor run cycle.

Ignition Control 103130-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E406	LSOM - Compressor open start circuit.	Required amount of current is not passing through Start current transformer. Clears the error after current is sensed in START sensor, or after power reset.
E407	LSOM - Compressor open run circuit.	Required amount of current is not passing through Run current transformer. Clears the error after current is sensed in RUN sensor, or 1 normal compressor run cycle, or after power reset.
E408	LSOM - Compressor contactor is welded.	Compressor runs continuously. Clears the error after 1 normal compressor run cycle or after power reset.
E409	LSOM - Compressor low voltage.	Secondary voltage is below 18VAC. After 10 minutes, operation is discontinued. Clears the code after voltage is higher than 20 VAC for 2 seconds or after power reset.

TABLE 5

Ignition Control 107045-XX Diagnostic Codes

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
.	Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).	
A	Cubic feet per minute (cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed.	
C	Cooling stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes).	
d	Dehumidification mode (1 second ON) / 1 second OFF) / cfm setting displayed / Pause / Repeat Codes).	
h	Heat pump stage (1 second ON, 0.5 second OFF) / % of input rate displayed / Pause / cfm setting / Pause / Repeat codes.	
H	Gas Heat Stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes. Blinking during ignition.	
dF	Defrost mode.	
U	Discharge Air Temperature	
E000	No error in memory	
E105	Device communication problem - No other devices on RS BUS (Communication system).	
E110	Low line voltage.	Line Voltage Low (Voltage lower than nameplate rating). Check power line voltage and correct. Alarm clears 5 seconds after fault recovered.
E111	Low line voltage.	Reverse line power voltage wiring. System resumes normal operation 5 seconds after fault recovered.
E112	Ground not detected	System shuts down. Provide proper earth ground. System resumes normal operation 5 seconds after fault recovered.
E113	High line voltage.	Line Voltage High (Voltage higher than nameplate rating). Provide power voltage within proper range. System resumes normal operation 5 seconds after fault recovered.
E114	Line voltage frequency out-of-range.	No 60 Hertz Power. Check voltage and line power frequency. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E115	Low 24V - Control will restart if the error recovers.	24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. May require installation of larger VA transformer to be installed in furnace / air handler. Clears after fault recovered.
E117	Poor ground detected (Warning only)	Provide proper grounding for unit. Check for proper earth ground to the system. Warning only will clear 30 seconds after fault recovered.
E120	Unresponsive device. Communication only.	Usually caused by delay in outdoor unit responding to indoor unit polling. Recycle power. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.

Ignition Control 107045-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E124	Active communicating thermostat signal missing for more than 3 minutes.	Equipment lost communication with the thermostat. Check four wiring connections, ohm wires and cycle power at the thermostat. Alert stops all services and waits for heartbeat message from thermostat (subnet controller). Cleared after valid thermostat (subnet controller) message is received.
E125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.).	Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Critical alert. Cleared 300 seconds after fault recovered.
E131	Corrupted control parameters (Verify configuration of system). Communicating only.	Reconfigure the system. Replace control if heating or cooling is not available. Only applicable in the communicating mode, not in startup. Exit from Commissioning and Execute 'Set Factory Default mode Control will still operate on default parameter settings
E150	A2L Refigerant leak alarm	
E151	A2L Sensor fault (sensor problem) (communication mode only)	
E180	Outdoor air temperature sensor failure. Only shown if shorted or out-of-range.	Compare outdoor sensor resistance to temperature/ resistance charts in unit installation instructions. Replace sensor pack if necessary. At beginning of (any) configuration, furnace or air handler control will sense outdoor air and discharge air temperature sensor(s). If detected (reading in range), appropriate feature will be set as 'installed' and that could be seen in 'About' screen. In normal operation after control recognizes sensors, alarm will be sent if valid temperature reading is lost. To get rid of setting and alarm, redo configuration and make sure that temperature sensor is marked as 'not installed' in Indoor Unit 'About' screen. When Indoor unit control is replaced, thermostat will 'tell' new control if temperature sensor is in system or not. Clears 30 seconds after fault recovered.
E200	Hard lockout - Rollout circuit open or previously open.	Correct cause of rollout trip, or replace flame rollout switch. Test furnace operation. Cleared after fault recovered.
E201	Indoor blower communication failure - Unable to communicate with blower motor.	Indoor blower communication failure (including power outage). Lost communication with indoor blower motor. Possible causes: motor not powered, loose wiring. Problem may be on control or motor side. Cleared after fault recovered.
E202	Indoor blower motor mis-match - Indoor motor horsepower does not match unit capacity.	Incorrect appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace/Air Handler on configuration guide or in installation instructions. Cleared after the correct match is detected following a reset. (Remove thermostat from system while applying power and reprogramming.)
E203	Appliance capacity / size is NOT programmed. Invalid unit codes refer to configuration flow chart.	No appliance capacity code selected. Check for proper configuring under: Unit Size Codes for Furnace on configuration guide or in installation instructions. Critical Alert. Cleared after valid unit code is read following a reset. (Remove thermostat from system while applying power and reprogramming.)
E204	Gas valve mis-wired.	Check gas valve operation and wiring. Clears when repaired.
E205	Gas valve control relay contact shorted.	Check wiring on control and gas valve. If wiring is correct, replace control.

Ignition Control 107045-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E206	Gas valve second-stage relay failure	Furnace will operate on 1st stage for remainder of the heating demand. Will clear after fault recovered. If unable to operate 2nd stage, replace control.
E207	Hot surface ignitor sensed open.	Measure resistance of hot surface ignitor. Replace if open or not within specified range found in IOM. Resumes normal operation after fault is cleared.
E223	Low pressure switch failed open.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared
E224	Low pressure switch failed closed.	Check operation of low pressure switch to see if it is stuck closed on heat call longer than 150 seconds. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E225	High pressure switch failed open.	Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E226	High pressure switch failed closed	Check operation of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E227	Low pressure switch open during trial for ignition or run mode.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E228	Combustion air inducer calibration failure	Unable to perform pressure switch calibration. Check vent system and pressure switch wiring connections. Resumes normal operation after fault is cleared.
E229	Ignition on high fire	IFC switched to high fire ignition because low fire pressure switch did not close in allowed time. No action is needed.
E240	Low flame current - Run mode.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Alert clears after current heat call has been completed.
E241	Flame sensed out of sequence - Flame still present.	Shut off gas. Check for gas valve leak. Replace, if necessary. Alert clears when fault is recovered.
E250	Limit switch circuit open.	Check for proper firing rate on furnace. Ensure there is no blockage in heater. Check for proper air flow. If limit not closed within 3 minutes, unit will go into 1-hour soft lockout. Resumes normal operation after fault is cleared.
E252	Discharge air temperature too high (gas heat only).	Check temperature rise, air flow and input rate. Cleared when heat call is finished.
E270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.	Check for proper gas flow. Ensure that ignitor is lighting burner. Check flame sensor current. Clears when heat call finishes successfully.

Ignition Control 107045-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E272	Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.	Check operation of low pressure switch to see if it is stuck closed on heat call. Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E273	Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Clears when heat call finishes successfully.
E274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes	Shut down system. 1-hour soft lockout. Check firing rate and air flow. Check for blockage. Clears when heat call finishes successfully.
E275	Soft lockout - Flame sensed out of sequence. Flame signal is gone.	Shut off gas. Check for gas valve leak. 1-hour soft lockout. Clears when flame has been proven stable.
E290	Ignitor circuit fault - Failed ignitor or triggering circuitry.	Measure resistance of hot surface ignitor. Replace if open or not within specifications. 1-hour soft lockout. Clears when flame has been proven stable.
E292	Indoor blower motor unable to start due to obstructed wheel, seized bearings.	Indoor blower motor unable to start (seized bearing, stuck wheel, etc.). Replace motor or wheel if assembly does not operate or meet performance standards. 1-hour soft lockout. Clears after circulator successfully starts.
E295	Indoor blower motor temperature is too high.	Indoor blower motor over temperature (motor tripped on internal protector). Check motor bearings and amps. Replace if necessary. Cleared after blower demand is satisfied.
E310	Discharge error temperature sensor failure. Only shown if shorted or out of range.	Compare outdoor sensor resistance to temperature/ resistance charts in installation instructions. Replace sensor if necessary. Cleared in Communicating mode: 30 seconds after fault recovered. In Non-Communicating mode: Cleared after the current heat call is completed.
E311	Heat rate reduced to match indoor blower air flow.	Warning Only. Furnace blower in cutback mode due to restricted airflow. Reduce firing rate every 60 seconds to match available CFM. Check filter and duct system. To clear, replace filter if needed or repair/ add duct. 2-stage controls will reduce firing rate to 1st stage. Clears when heat call finishes successfully.

Ignition Control 107045-XX Diagnostic Codes Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E312	Restricted air flow in cooling or continuous fan mode is lower than cfm setting.	Warning Only. Restricted airflow - Indoor blower is running at a reduced CFM (Cutback Mode - The variable speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating outside of design parameters (0 to 0.8" W.C.. total external static pressure). Check filter and duct system. To clear, replace filter if needed or repair/add duct. Cleared after the current service demand is satisfied.
E313	Indoor or outdoor unit capacity mismatch. Communication only.	Incorrect indoor/outdoor capacity code selected. Check for proper configuring in installation instructions. Alarm is just a warning. The system will operate, but might not meet efficiency and capacity parameters. Alarm will clear when commissioning is exited. Cleared after commissioning is complete.
E334	Relay "Y1" stuck on interated control.	Replace integrated control.
E345	Relay O Failure	
E347	No 24 Volt output on Y1 of "integrated control" with non communicating outdoor unit.	Operation stopped. Y1 relay / Stage 1 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E348	No 24 Volt output on Y2 of "integrated control" with non?communicating outdoor unit.	Y2 relay / Stage 2 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
E370	Interlock switch sensed open for 2 minutes.	Control sees the loss of 24VAC for 2 minutes. Terminate all services and wait for interlock switch to close. The alarm will clear when 24VAC is continuously sensed on DS terminal for a minimum of 10 seconds or on a power reset.

DIP Switch Settings

NOTE - All communicating settings are set at the communicating thermostat. See thermostat installation instruction. In a communication system all DIP switch and clippable link settings are ignored. For conventional thermostats proceed with DIP switch and clippable link settings as outlined in the following.

Heating Operation DIP Switch Settings

Switch 1 -- Thermostat Selection -- This unit may be used with either a single-stage or two-stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory-positioned for use with a two-stage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned.

- Select "OFF" for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);
- Select "ON" for two-stage heating operation controlled by a single-stage heating thermostat. This setting provides a timed delay before second-stage heat is initiated.

Switch 2 -- Second Stage Delay (Used with Single-Stage Thermostat Only) -- This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the OFF position, which provides a 7-minute delay before secondstage heat is initiated. If the switch is toggled to the ON position, it will provide a 12-minute delay before secondstage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for SINGLEstage thermostat use.

Switches 3 and 4 -- Blower-Off Delay -- The blower-on delay of 30 seconds is not adjustable. The blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 3 and 4 on the integrated control. The unit is shipped from the factory with a blower-off delay of 90 seconds. The blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. TABLE 6 provides the blower off timings that will result from different switch settings.

TABLE 6
Blower Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 3	Switch 4
60	On	Off
90 (factory)	Off	Off
120	Off	Off
180	On	Off

Indoor Blower Operation DIP Switch Settings

Switches 5 and 6 -- Cooling Mode Blower Speed --

The unit is shipped from the factory with the dip switches positioned for high speed (4) indoor blower motor operation during the cooling mode. TABLE 7 provides the cooling mode blower speeds that will result from different switch settings. Switches 5 and 6 set the blower cfm for secondstage cool. The integrated control automatically ramps down to 70% of the second-stage cfm for first-stage cfm. Refer to blower tables for corresponding cfm values.

TABLE 7
Cooling Mode Blower Speeds

Speed	Switch 5	Switch 6
Low	On	On
Medium Low	Off	On
Medium High	On	Off
High (Factory)	Off	Off

Switches 7 and 8 -- Cooling Blower Speed Adjustment

-- The unit is shipped from the factory with the dip switches positioned for NORMAL (no) adjustment. The dip switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. TABLE 8 below provides blower speed adjustments that will result from different switch settings. Refer to blower tables for corresponding cfm values.

TABLE 8
Cooling Blower Speed Adjustment

Adjustment	Switch 7	Switch 8
+10% (approx.)	On	Off
Factory Default	Off	Off
-10% (approx.)	Off	On

Switches 9 and 10 -- Cooling Mode Blower Speed Ramping

-- Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on dehumidification performance. TABLE 9 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed below.

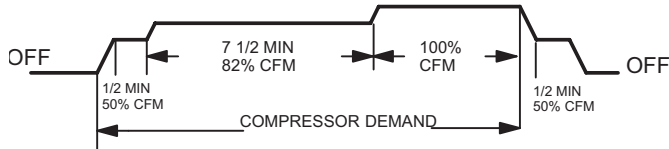
NOTE - The off portion of the selected ramp profile also applies during heat pump operation in dual fuel applications.

TABLE 9
Cooling Mode Speed Ramping

Ramping Option	Switch 9	Switch 10
A (factory)	Off	Off
B	Off	On
C	On	Off
D	On	On

Ramping Option A (Factory Selection)

- Motor runs at 50% for 30 seconds.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 30 seconds then ramps down to stop.



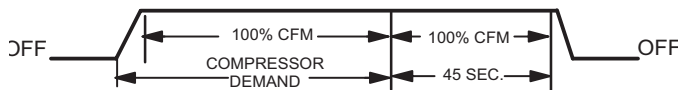
Ramping Option B

- Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Ramping Option C

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds then ramps down to stop.



Ramping Option D

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Switches 11, 12 and 13 -- Heating Mode Blower Speed

The switches are factory set to the OFF position which provides factory default heat speed. Refer to TABLE 10 for switches 11, 12 and 13 that provided the corresponding increases or decrease to both high and low heat demand.

TABLE 10

Heating Mode Blower Speeds

Heat Speed	Switch 11	Switch 12	Switch 13
Increase 24%	On	On	On
Increase 18%	On	On	Off
Increase 12%	On	Off	On
Increase 6%	On	Off	Off
Factory Default	Off	Off	Off
Decrease 6%	Off	Off	On
Decrease 12%	Off	On	Off
Decrease 18%	Off	On	On

Switches 14 and 15 -- Continuous Blower Speed

TABLE 11 provides continuous blower speed adjustments that will result from different switch settings.

TABLE 11

Continuous Blower Speed

Continuous Blower Speed	Switch 14	Switch 15
28% of High Cool Speed	Off	On
38% of High Cool Speed (Factory Setting)	Off	Off

On-Board Links

Note: Communicating systems with a conventional outdoor unit (non-communicating), the on-board clippable links must be set to properly configure the system.

⚠ IMPORTANT

Carefully review all configuration information provided. Failure to properly set DIP switches, jumpers and on-board links can result in improper operation!

On-Board Link W914 Dehum or Harmony (R to DS)

On-board link W914, is a clippable connection between terminals R and DS on the integrated control. W914 must be cut when the furnace is installed with either the Harmony III zone control or a thermostat which features humidity control. If the link is left intact the PMW signal from the Harmony III control will be blocked and also lead to control damage. Refer to TABLE 12 for operation sequence in applications including SL280DFV, a thermostat which features humidity control and a single-speed outdoor unit. TABLE 13 gives the operation sequence in applications with a two-speed outdoor unit.

On-Board Link W951 Heat Pump (R to O)

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal "O" will remain energized eliminating the HEAT MODE in the heat pump.

On-Board Link W915 2 Stage Compr (Y1 to Y2)

On-board link W915 is a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two-stage cooling will be used. If the Y1 to Y2 link is not cut the outdoor unit will operate in second-stage cooling only.

**TABLE 12
OPERATING SEQUENCE**

SL280DFV Non-Communicating Thermostat with Humidity Control Feature and Single-Speed Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND				SYSTEM RESPONSE				
System Condition	Step	Thermostat Demand				Relative Humidity		Compressor	Blower CFM (cool)	Comments
		Y1	O	G	W1	Status	D			
<i>NO CALL FOR DEHUMIDIFICATION</i>										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	CS7500 thermostat energizes Y1 and de-energizes D on a call for de-humidification
Dehumidification call	2	On	On	On		Demand	0 VAC	High	70%*	
<i>PRECISION MODE (operates independent of a Y1 demand)</i>										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On		Demand	0 VAC	High	70%*	
Dehumidification Call Only	1	On	On	On		Demand	0 VAC	High	70%*	CS7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
Jumpers at indoor unit with a single stage outdoor unit. With Condensing unit - Cut W914 (R to DS) on SureLight® control With Heat Pump - Cut W914 (R to DS) & W951 (R to O) on SureLight® control										
CS7500 thermostat to use for this application - Y2081 4 heat / 2 cool										
*Dehumidification blower speed is 70% of COOL speed for all units .										
**In Precision mode, CS7000 thermostat will maintain room temperature up to 2 °F (1.2°C) cooler than room setting.										

**TABLE 13
OPERATING SEQUENCE**

SL280DFV, Non-Communicating Thermostat with Humidity Control Feature and Two-Speed Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND						SYSTEM RESPONSE				
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (cool)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation Y1	1	On		On	On			Acceptable	24 VAC	Low	70%*	Compressor and indoor blower follow thermostat demand
Normal Operation Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	CS7500 thermostat energizes Y1 and de-energizes D on a call for de-humidification
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%**	
PRECISION MODE (operates independent of a Y1 demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
Dehumidification Call Only	1	On	On	On	On			Demand	0 VAC	High	70%**	CS7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	CS7500 thermostat energizes Y2 and de-energizes D on a call for de-humidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
Dehumidification Call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%**	CS7500 thermostat will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint***
	Jumpers at indoor unit with a two stage outdoor unit Cut factory jumper from Y1 to Y2 or cut W915 (Y1 to Y2) With Condensing unit - Cut W914 (R to DS) on SureLight® control With Heat Pump - Cut W914 (R to DS) & W951 (R to O) on SureLight® control											
CS7500 thermostat to use for this application - Y2081 4 heat / 2 cool												
*Normal operation first stage cooling blower speed is 70% COOL speed.												
**Dehumidification blower speed is, reduced to 70% of COOL.												
***In Precision mode, CS7000 thermostat will maintain room temperature up to 2 °F (1.2°C) cooler than room setting.												

B- Indoor Blower Motor

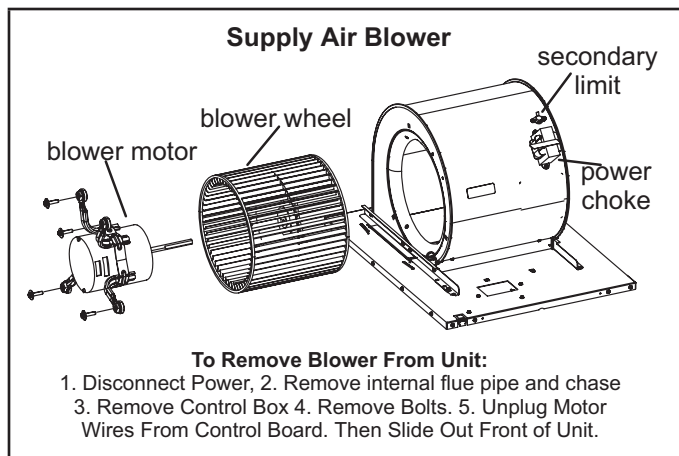


FIGURE 7

⚠ WARNING

During blower operation, the ECM motor emits energy that may interfere with pacemaker operation. Interference is reduced by both the sheet metal cabinet and distance.

The motor communicates with the integrated control via a 2-way serial connection. The motor receives all necessary functional parameters from the integrated control and does not rely on a factory program like traditional variable speed motors. SL280DFV units use a three-phase, electronically controlled D.C. brushless motor (controller converts single phase a.c. to three phase D.C.), with a permanent-magnet type rotor (FIGURE 8). Because this motor has a permanent magnet rotor it does not need brushes like conventional D.C. motors.

The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to turn on and off in sequence by the controller.

⚠ IMPORTANT

Earlier ECM motors used on other Lennox furnace models are not interchangeable with motors used on the SL280DF furnace line.

A solid-state controller is permanently attached to the motor. The controller is primarily an A.C. to D.C. converter. Converted D.C. power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload).

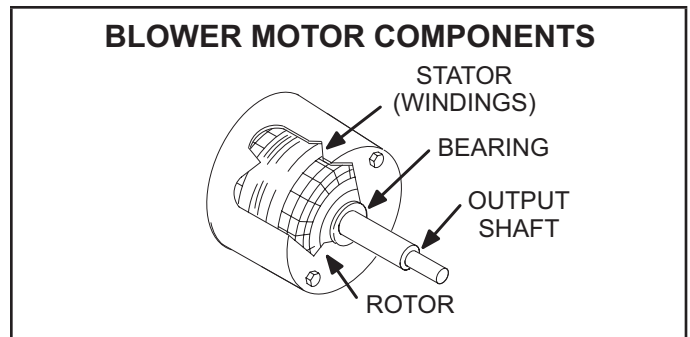


FIGURE 8

The controller uses sensing devices to sense what position the rotor is in at any given time. By sensing the position of the rotor and then switching the motor windings on and off in sequence, the rotor shaft turns the blower.

All SL280DFV blower motors use single phase power. An external run capacitor is not used. The motor uses permanently lubricated ball-type bearings.

Internal Operation

The motor is controlled via serial communication between the integrated control on the furnace and the controller attached to the motor shell. The messages sent back and forth between the two controls serve to communicate rotational direction, demand, motor size, current draw, torque, and rpm, among other variables.

Motor rpm is continually adjusted internally to maintain constant static pressure against the blower wheel. The controller monitors the static work load on the motor and motor ampdraw to determine the amount of rpm adjustment. Blower rpm may be adjusted any amount in order to maintain a constant cfm as shown in Blower Ratings Tables. The cfm remains relatively stable over a broad range of static pressure. Since the blower constantly adjusts rpm to maintain a specified cfm, motor rpm is not rated. Hence, the terms "cool speed", "heat speed" or "speed tap" in this manual, on the unit wiring diagram and on blower B3, refer to blower cfm regardless of motor rpm.

Initial Power Up

When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce the disconnect switch when applying power to the unit.

Motor Start-Up

When B3 begins start-up, the motor gently vibrates back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 10-15 seconds to reach full speed. If the motor does not reach 200 rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. The shutdown feature provides protection in case of a frozen bearing or blocked blower wheel. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

The DC filter capacitors inside the controller are connected electrically to the motor supply wires. The capacitors take approximately 5 minutes to discharge when the disconnect is opened. For this reason it is necessary to wait at least 5 minutes after turning off power to the unit before attempting to service motor.

 WARNING	
	Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to service motor. Failure to wait may cause personal injury or death.

Power Choke (L13)

A choke coil is used on SL280DFV 4 and 5 ton units equipped with 1 hp motors. The choke is located on the blower housing and is used to suppress transient current spikes.

Troubleshooting Motor Operation

To verify motor operation see steps below:

- 1 - Remove J48 (5 pin power plug) from P48 on the motor.
- 2 - With the power on at the furnace and door switch depressed, use a test meter to verify 120V between pins 4 and 5 on J48.
- 3 - Reconnect J48 to P48 on the motor.
- 4 - Remove J49 (4 pin low voltage connector) from P49 on the motor.
- 5 - Using test jumpers, apply 24V to pins 3 and 4 on P49 on the motor.
***Note:** Do not apply 24V to pins 2 and 4 on P49. Doing so will cause permanent damage to the motor.*
- 6 - Motor should run at 75%.
- 7 - Test is complete. Remove jumpers and reconnect plugs.

Another option is to use the TECMate PRO motor tester with the 16 to 4 pin adaptor. The use of the TECMate PRO isolates the motor from the integrated control. Follow the instructions provided with the kit. If the motor runs do not replace.

BLOWER B3 HARNESS CONNECTORS

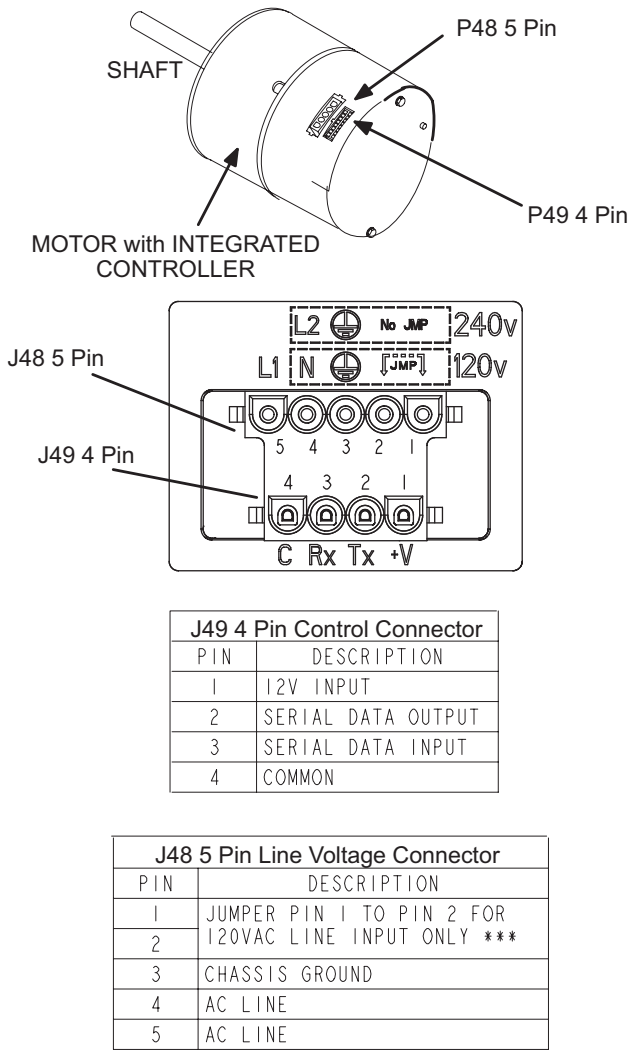


FIGURE 9

BLOWER B3 HARNESS CONNECTORS

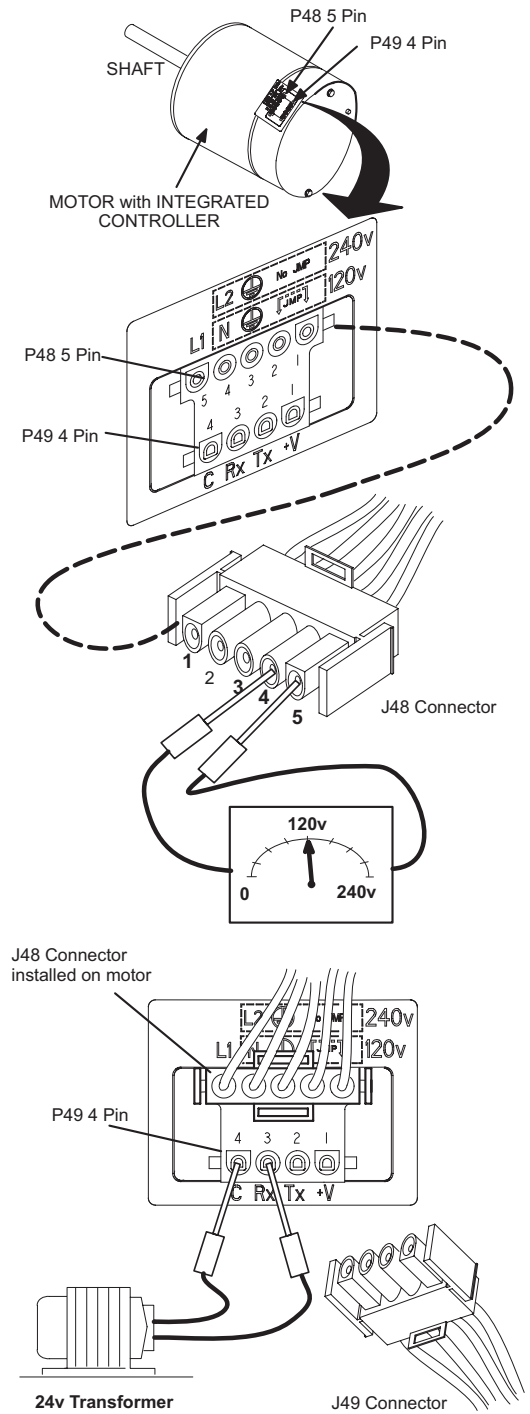


FIGURE 10

Troubleshooting Motor Windings

Ensure that motor windings are not damaged by performing the following tests:

NOTE - If your ohm meter is not an auto-ranging type, set it to the highest ohm scale (100k ohms or greater) before performing tests.

TABLE 14
Ohm Meter Range

Scale	Measurement Range	
	in words	ohms
2M	two megohm -- two million ohms	0-2,000,000
200K	two hundred kilohm -- two hundred thousand ohms	0-200,000
20K	twenty kilohm -- twenty thousand ohms	0-20,000
2K	two kilohm -- two thousand ohms	0-2,000
200	two hundred ohm	0-200

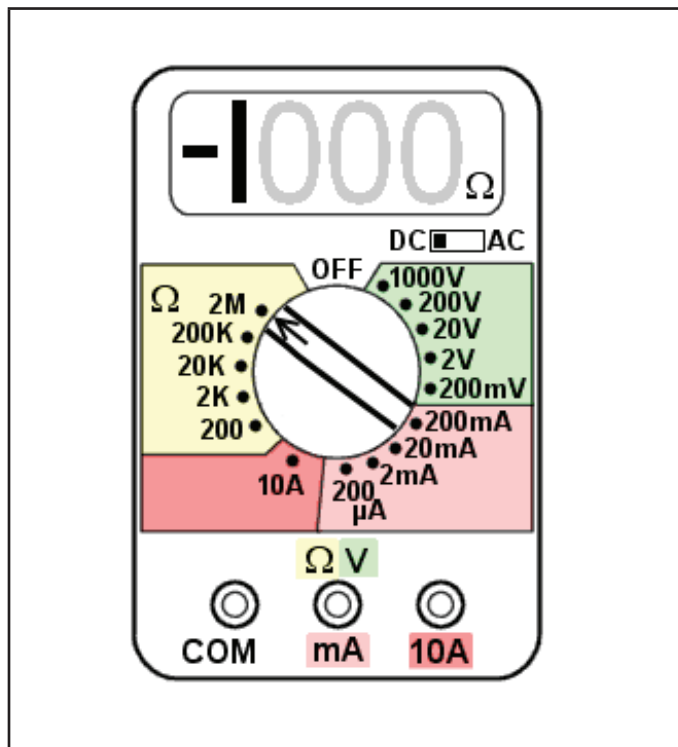


FIGURE 11

TEST A

Measure the resistance between each of the three motor leads (3-pin plug) and the unpainted part of the end shield.

If the winding resistance to ground is <100k ohms, replace the motor and control module. If the resistance to ground is >100k, the motor windings are fine. Proceed to Test B.

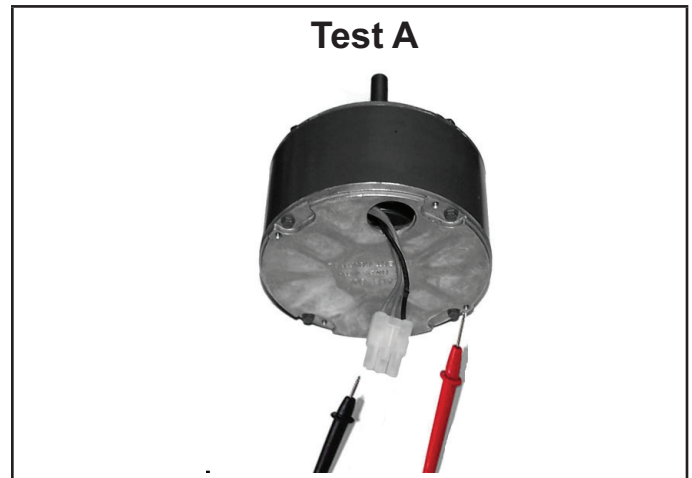


FIGURE 12

TEST B

Use an ohmmeter to measure the motor phase-to-phase resistance by checking these combinations of the the 3-pin motor plug. For the purpose of this test, start at either end of the connector as lead 1.

- 1 - The lead-to-lead resistance across any two leads should be less than 20 ohms.
- 2 - Each lead-to-lead resistance should be the same. If the measured resistance is greater than 20 ohms, replace the motor and control module.

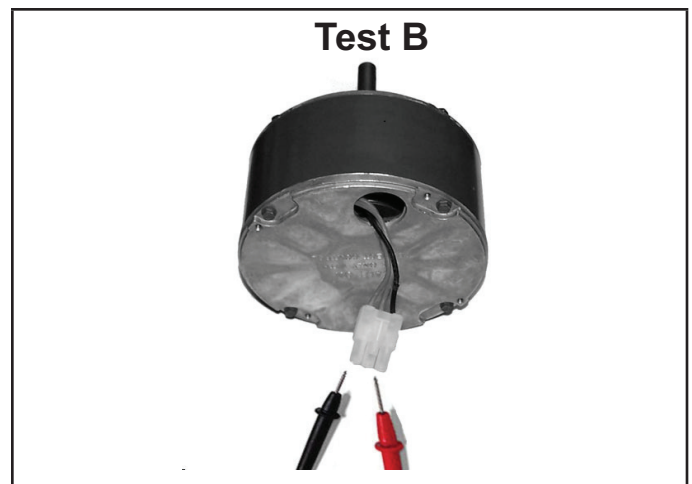


FIGURE 13

C- Heating Components

1. Ignitor

The SureLight® ignitor is made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. The integrated control provides a regulated 120 volts to the ignitor for a consistent ignition and long ignitor life. Ohm value should be 39 to 70. See FIGURE 14 for ignitor location and FIGURE 15 for ignitor check out.

NOTE - The SL280DFV(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

2. Flame Sensor

A flame sensor is located on the left side of the burner support. See FIGURE 14. The sensor is tip protrudes into the flame envelope of the left-most burner. The sensor can be removed for service without removing any part of the burners. During operation, flame is sensed by current passed through the flame and sensing electrode. The SureLight control allows the gas valve to remain open as long as flame signal is sensed. To check flame sense signal use the push-button found on the integrated control and go to Field Test Mode. The menu will display the flame signal. See TABLE 15 for flame signal.

TABLE 15
Flame Signal in Microamps

Normal	Low	Drop Out
2.6 or greater	2.5 or less	1.1

3. Gas Valve

The valve (FIGURE 17 or FIGURE 18) is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

24VAC terminals and gas control knob are located on the valve. A wire harness connects the terminals from the gas valve to the electronic ignition control. 24V applied to the terminals energizes the valve.

Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve.

LPG change over kits are available from Lennox. Kits include burner orifices and a gas valve.

4. Flame Rollout Switches (S47)

Flame rollout switch is a high temperature limit located on top of the burner box, one on each side.- See FIGURE 14. The limit is a N.C. SPST manual-reset limit connected in series with the secondary limit S21. When S47 senses rollout, the circuit breaks and the ignition control immediately stops ignition and closes the gas valve. Rollout can be caused by a blocked heat exchanger, flue or lack of combustion air. The switch is factory set to trip (open) at 210°F and cannot be adjusted. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the control.

5. Burners

All units use inshot burners. Burners are factory set and require no adjustment. Always operate the unit with the burner box front panel in place. Each burner uses an orifice (see TABLE 20 for orifice size) that is precisely matched to the burner input. Burners can be removed as a one piece assembly for service. If burner assembly has been removed, it is critical to align center of each burner to the center of the clamshell when re-installing. See more detail in Section VI- MAINTENANCE sub-section A- Heat Exchanger and Burners.

6. Primary Limit Control (S10)

The primary limit (S10) is located in the heating vestibule panel. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or the SureLight control will go into Watch guard for one hour. The switch is factory set and cannot be adjusted. The switch may have a different set point for each unit model number. See Lennox Repair Parts Handbook if limit switch must be replaced,

7. Secondary Limit Controls (S21)

The secondary limit (S21) is located in the blower compartment. See FIGURE 7. When excess heat is sensed in the blower compartment, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or the SureLight control will go into Watch guard for one hour. The switch is factory set and cannot be adjusted.

HEATING COMPONENTS

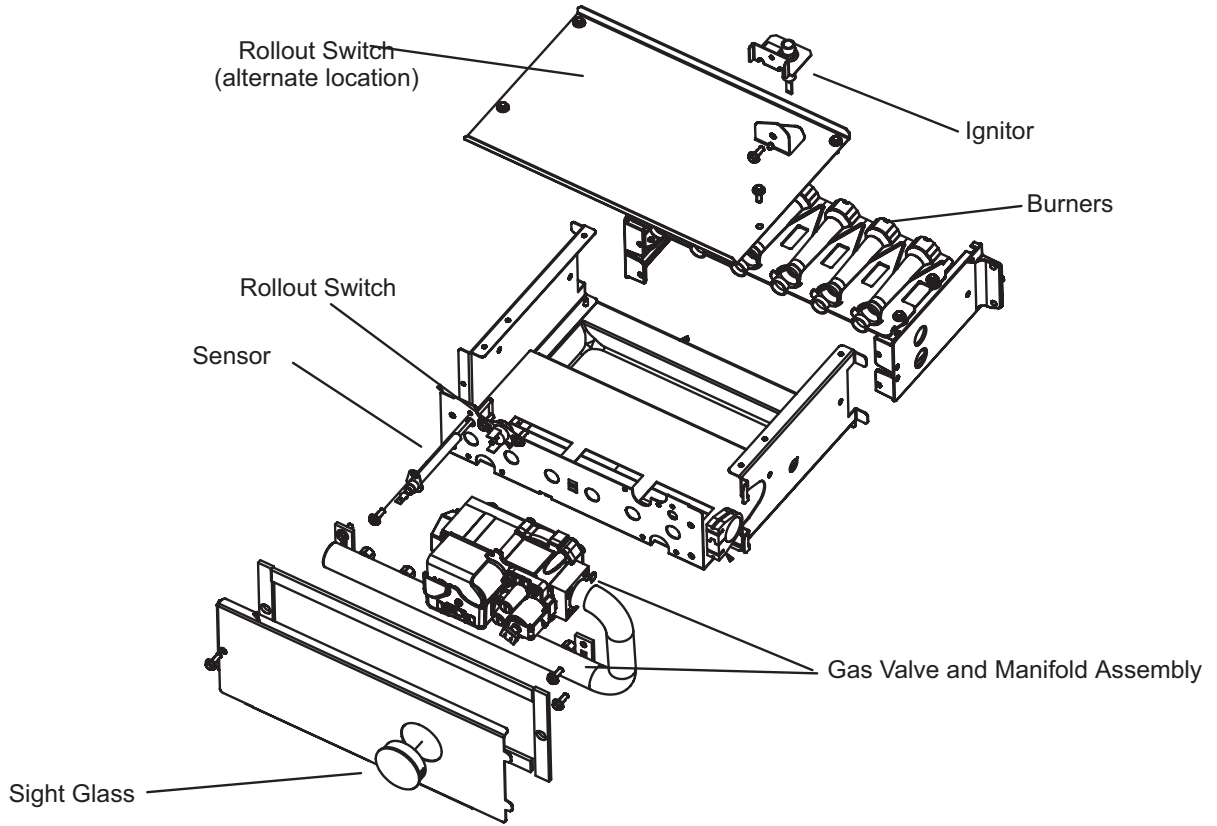


FIGURE 14

Ignitor Check Out

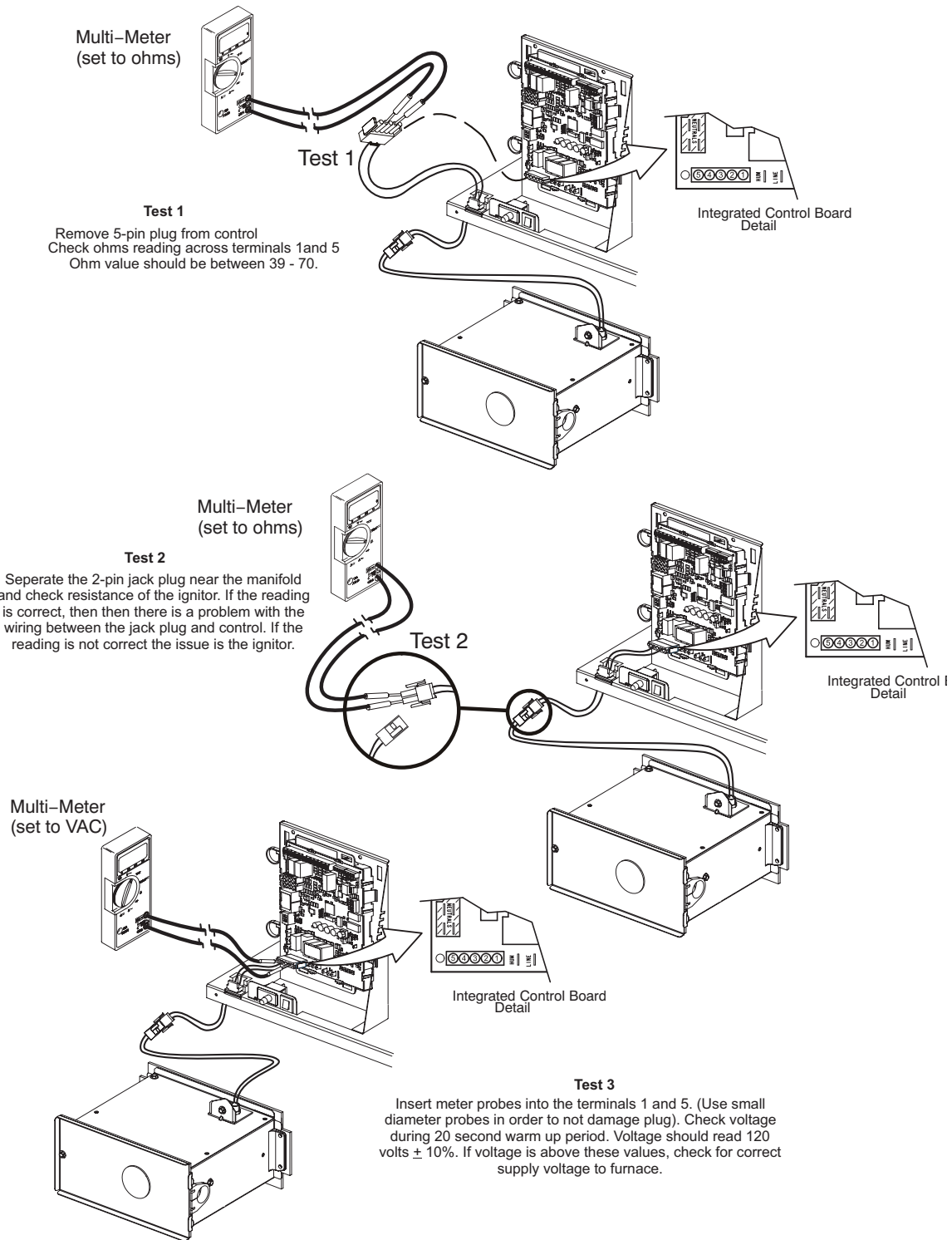


FIGURE 15

8. Combustion Air Inducer (B6)

All units use a two-stage combustion air inducer to move air through the burners and heat exchanger during heating operation. The blower uses a 120VAC motor. The motor operates during all heating operation and is controlled by furnace / blower control A92. The inducer also operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge). The inducer operates on low speed during first-stage heat, then switches to high speed for second stage heat.

NOTE - Each furnace model uses a unique CAI. Refer to Lennox Repair Parts listing for correct inducer for replacement.

A pressure switch connected to the combustion air inducer orifice plate is used to prove inducer operation. The combustion air inducer orifice will be different for each model. See TABLE 16 for orifice sizes. The switch monitors air pressure in the inducer housing. During normal operation, the pressure in the housing is negative. If pressure becomes less negative (signifying an obstruction) the proving switch opens. When the proving switch opens, the furnace control (A92) immediately closes the gas valve to prevent burner operation.

TABLE 16

Unit	C.A.I. Orifice Size
-070	1.375
-090	1.625
-110	1.844

9. Combustion Air Inducer Pressure Switch (S18)

S18 is a dual combustion air pressure switch (first and second stage) located on the combustion air inducer orifice bracket. The switch is connected to the combustion air inducer housing by means of a flexible silicone hose. It monitors negative air pressure in the combustion air inducer housing.

The switches are a single-pole single-throw proving switch electrically connected to the furnace control. The purpose of the switch is to prevent burner operation if the combustion air inducer is not operating or if the flue becomes obstructed.

On heat demand (first or second stage) the switch senses that the combustion air inducer is operating. It closes a circuit to the furnace control when pressure inside the combustion air inducer decreases to a certain set point. Set points vary depending on unit size.

See TABLE 17. The pressure sensed by the switch is negative relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. A bleed port on the switch allows relatively dry air in the vestibule to purge switch tubing, to prevent condensate build up.

NOTE - The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be by-passed for any reason. If switch is closed or by-passed, the control will not initiate ignition at start up.

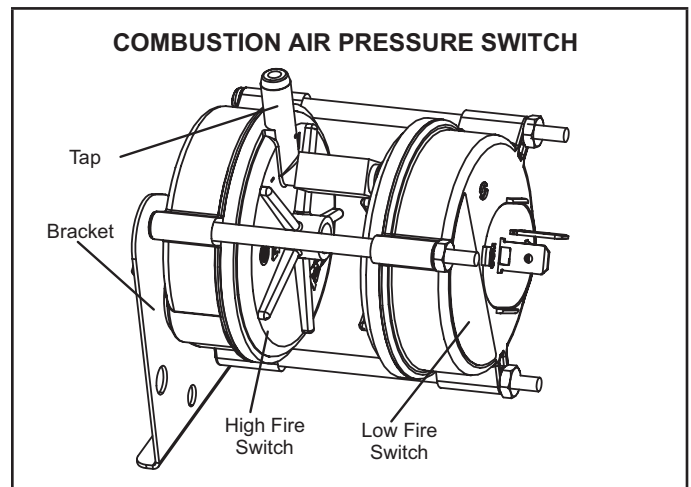


FIGURE 16

TABLE 17

Unit	Set Point High Heat	Set Point Low Heat
-070	0.55	0.20
-090	0.55	0.20
-110	0.60	0.25

II-PLACEMENT AND INSTALLATION

Make sure unit is installed in accordance with installation instructions and applicable codes.

III-START-UP

A-Preliminary and Seasonal Checks

- 1 - Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.
- 2 - Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit

B-Heating Start-Up

WARNING

Shock and burn hazard.

SL280DFV units are equipped with a hot surface ignition system. Do not attempt to light manually.

- 1 - **STOP!** Read the safety information at the beginning of this section.
- 2 - Set the thermostat to the lowest setting
- 3 - Turn off all electrical power to the unit.
- 4 - This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
- 5 - Remove the upper access panel.
- 6 - Turn switch on gas valve to OFF. Do not force. See FIGURE 17 or FIGURE 18.
- 7 - Wait five minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- 8 - If you do not smell gas go to next step.

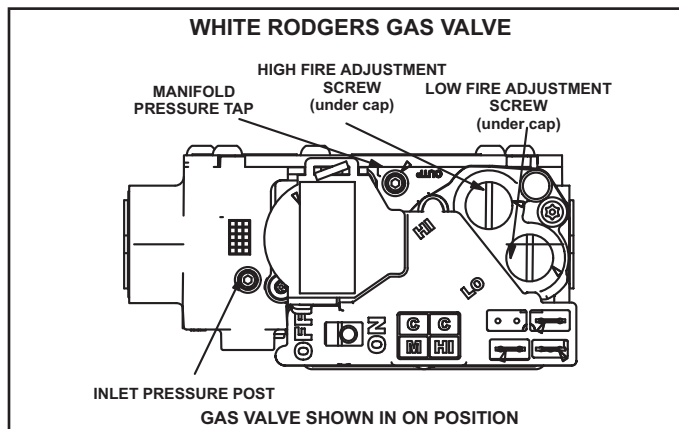


FIGURE 17

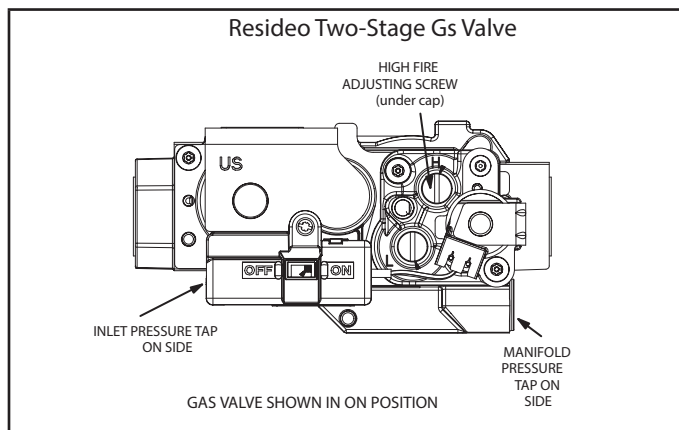


FIGURE 18

- 9 - Turn switch on gas valve to **ON**. Do not force. See FIGURE 17 or FIGURE 18.
- 10 - Replace the upper access panel.
- 11 - Turn on all electrical power to the unit.
- 12 - Set the thermostat to desired setting.

NOTE - When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.

Turning Off Gas To Unit

- 1 - Set thermostat to lowest setting.
- 2 - Turn off all electrical power to unit if service is to be performed.
- 3 - Remove access panel.
- 4 - Turn switch on gas valve to **OFF**. Do not force. See FIGURE 17 or FIGURE 18.
- 5 - Replace access panel.

Failure To Operate

If the unit fails to operate, check the following:

- 1 - Is the thermostat calling for heat?
- 2 - Are access panels securely in place?
- 3 - Is the main disconnect switch closed?
- 4 - Is there a blown fuse or tripped circuit breaker?
- 5 - Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.
- 6 - Is gas turned on at the meter?
- 7 - Is the manual main shut-off valve open?
- 8 - Is the internal manual shut-off valve open?
- 9 - Is the unit ignition system in lock out? If the unit locks out again, call the service technician to inspect the unit for blockages.
- 10 - Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages.
- 11 - Are flame rollout switches tripped? If flame rollout switches are tripped, call the service technician for inspection.

C-Safety or Emergency Shutdown

Turn off unit power. Close manual and main gas valves.

D-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Close all gas valves (both internal and external to unit) to guarantee no gas leak into combustion chamber. Turn off power to unit. All access panels and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS

A-CSA Certification

All units are CSA design certified without modifications. Refer to the SL280DFV Installation Instruction.

B-Gas Piping

⚠ IMPORTANT

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet. The flexible connector can then be added between the black iron pipe and the gas supply line.

⚠ WARNING

Do not over torque (800 in-lbs) or under torque (350 in-lbs) when attaching the gas piping to the gas valve.

Gas supply piping should not allow more than 0.5"W.C. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

Compounds used on gas piping threaded joints should be resistant to action of liquefied petroleum gases.

C-Testing Gas Piping

⚠ IMPORTANT

In case emergency shutdown is required, turn off the main shut-off valve and disconnect the main power to unit. These controls should be properly labeled by the installer.

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (14" W.C.). See FIGURE 19. If the pressure is equal to or less than 0.5psig (14"W.C.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.

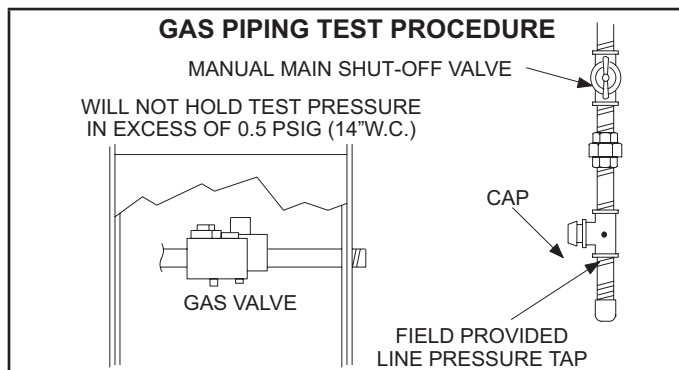


FIGURE 19

When checking piping connections for gas leaks, use preferred means. Kitchen detergents can cause harmful corrosion on various metals used in gas piping. Use of a specialty Gas Leak Detector is strongly recommended. It is available through Lennox under part number 31B2001. See Corp. 8411-L10, for further details.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

D-Testing Gas Supply Pressure

White Rodgers Gas Valve

An inlet post located on the gas valve provides access to the supply pressure. See FIGURE 17. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure supply pressure. See TABLE 20 for supply line pressure.

Honeywell / ResideoGas Valve

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap. Remove the threaded plug, install a field-provided barbed fitting and connect a manometer to measure supply pressure. See TABLE 20 for supply line pressure. Replace the threaded plug after measurements have been taken.

E-Check Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold pressure are made as verification of proper regulator adjustment.

Manifold pressure can be measured at any time the gas valve is open and is supplying gas to the unit. See TABLE 20 for normal operating manifold pressure.

⚠ CAUTION

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

The gas valve is factory set and should not require adjustment. All gas valves are factory regulated.

Manifold Adjustment Procedure:

- 1 - Connect test gauge to manifold pressure post (FIGURE 17) or tap (FIGURE 18) on gas valve.
- 2 - Ignite unit on low fire and let run for 5 minutes to allow for steady state conditions.
- 3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in TABLE 20.
- 4 - If necessary, make adjustments. FIGURE 17 and FIGURE 18 show location of high fire and low fire adjustment screw.
- 5 - Repeat steps 2, 3 and 4 on high fire.
- 6 - Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.
- 7 - Start unit and perform leak check. Seal leaks if found.

F- Proper Gas Flow (Approximate)

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in TABLE 18 below. If manifold pressure matches TABLE 20 and rate is incorrect, check gas orifices for proper size and restriction.

NOTE- To obtain accurate reading, shut off all other gas appliances connected to meter.

TABLE 18

GAS METERING CLOCKING CHART				
SL280 Unit	Natural 1000 btu/cu ft		LP 2500 btu cu/cu ft	
	Seconds For One Revolution			
	1 cu ft dial	2 cu fr dial	1 cu ft Dial	2 cu ft Dial
-070	55	110	136	272
-090	41	82	102	204
-110	33	66	82	164

IMPORTANT

For safety, shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

G- Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion.

See sections E- and F-. Take combustion sample beyond the flue outlet and compare to the table below. The maximum carbon monoxide reading should not exceed 100 ppm.

TABLE 19

Firing Rate	CO2% For Nat	CO2% For L.P.
High Fire	6.0 - 7.4	6.9 - 8.4
Low Fire	4.8 - 6.0	5.7 - 7.0
The carbon monoxide reading should not exceed 100 ppm.		

H-High Altitude

The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes. See TABLE 20 for manifold pressures, TABLE 21 for pressure switch kits and TABLE 22 or TABLE 23 for gas conversion kits.

TABLE 20

Manifold Pressure Settings

Unit Input	Gas	Orifice Size 0 - 7500 ft.	Orifice Size 0 - 7500 ft ¹ .	Manifold Pressure in. wg. 0 - 4500 ft		Manifold Pressure in. wg. 4500 - 7500 ft		Manifold Pressure in. wg. 7500 - 10,000 ft ²		Supply Line Pressure in. w.g.	
				Low Firer	High Fire	Low Fire	High Fire	Low Fire	High Fire	Min	Max
070	Natural	.063	.055.	1.7	3.5	1.6	3.4	1.7	3.5	4.5	13.0
	LP/propane ³	.034	.032	4.5	10.0	4.5	10.0	4.5	10.5	11.0	13.0
090	Natural	.063	.055	1.7	3.5	1.5	3.0	1.7	3.5	4.5	13.0
	LP/propane ³	.034	.032	4.5	10.0	4.5	10.0	4.5	10.0	11.0	13.0
110	Natural	.063	.055	1.7	3.5	1.5	3.2	1.7	3.5	4.5	13.0
	LP/propane ³	.034	.032	4.5	10.0	4.5	10.0	4.5	10.0	11.0	13.0

¹ This is the only permissible derate for these units.

² Natural gas high altitude orifice kit required.

³ A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

NOTE - Units may be installed at altitudes up to 4500 ft. above sea level without modifications.

TABLE 21

Unit Input	High Altitude Pressure Switch Kit		
	0 - 4500 ft.	4501 - 7500 ft.	7501 - 10,000 ft.
070	No Change	No Change	73W36
090	No Change	69W56	73W36
110	No Change	69W56	73W35

TABLE 22

Honeywell / Resideo Gas Valve Conversion Kits

Unit Input	High Altitude Natural Gas Orifice Kit	Natural Gas to LP/ Propane Kit		LP/ Propane to Natural Gas Kit
	7501 - 10,000 ft	0 - 7500 ft	7501 - 10,000 ft	0 - 7500 ft
070	73W37	51W02	73W38	69W79
090				
110				

TABLE 23

White Rodgers Gas Valve Conversion Kits

Unit Input	High Altitude Natural Gas Orifice Kit	Natural Gas to LP/ Propane Kit		LP/ Propane to Natural Gas Kit
	7501 - 10,000 ft	0 - 7500 ft	7501 - 10,000 ft	0 - 7500 ft
070	73W37	11K51	11K46	77W09
090				
110				

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

When the thermostat is set to "FAN ON," the indoor blower will run continuously at approximately 38% of the second-stage cooling speed when there is no cooling or heating demand.

When the SL280DFV is running on high fire or low fire (low fire is 91% of high fire), the indoor blower will run on the heating speed designated by the positions of DIP switches 11 and 12. When the SL280DFV is running on second-stage cool or first-stage cool (second-stage cool is 70% of firststage cool), the indoor blower will run on the cooling speed designated by the positions of DIP switches 5 and 6.

B-Temperature Rise

Temperature rise for SL280DFV units depend on unit input, blower speed, blower horsepower and static pressure as marked on the unit rating plate. The blower speed must be set for unit operation within the range of "TEMP. RISE °F" listed on the unit rating plate for high fire and low fire.

To Measure Temperature Rise:

- 1 - Place plenum thermometers in the supply and return air plenums. Locate supply air thermometer in the first horizontal run of the plenum where it will not pick up radiant heat from the heat exchanger.
- 2 - Set thermostat to highest setting. Confirm unit is on high fire by checking rate.
- 3 - After plenum thermometers have reached their highest and steadiest readings, subtract the two readings. The difference should be in the range listed on the unit rating plate. If the temperature is too low, decrease blower speed.
- 4 - Repeat on low fire. Do not adjust low fire manifold pressure.

C-External Static Pressure

- 1 - Tap locations shown in FIGURE 20.
- 2 - Punch a 1/4" diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with permagum. Connect the zero end of the manometer to the discharge (supply) side of the system. On ducted systems, connect the other end of manometer to the return duct as above. Open all return air registers and check for clean filter.
- 3 - With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements. For heating speed external static pressure drop must not be more than 0.8" W.C. For cooling speed external static pressure drop must not be more than 1.0" W.C.
- 4 - Seal the hole when the check is complete.

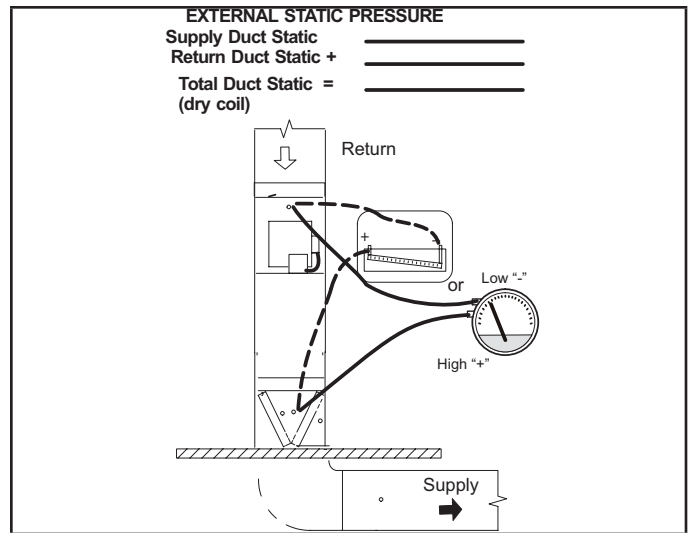


FIGURE 20

VI-MAINTENANCE

⚠ WARNING

Disconnect power before servicing unit.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠ WARNING

The inner blower access panel and vent pipe must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

⚠ WARNING

Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

⚠ CAUTION

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

⚠ WARNING

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

Annual Furnace Maintenance

At the beginning of each heating season, and to comply with the **Lennox Limited Warranty**, your system should be checked by a licensed professional technician (or equivalent) as follows:

A "Disconnected Vent" warning sticker should be attached to a visible area of the plenum near the vent pipe. If the sticker is not legible or missing, order kit 66W04 for replacement stickers.

- 1 - Check wiring for loose connections, voltage at indoor unit and amperage of indoor motor.
- 2 - Check the condition of the belt and shaft bearings if applicable.
- 3 - Inspect all gas pipe and connections for leaks.

Check the cleanliness of filters and change if necessary (m o n t h l y) .

IMPORTANT

If a highefficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. Highefficiency filters have a higher static pressure drop than standardefficiency glass/foam filters. If the pressure drop is too great, system capacity and performance may be reduced.

The pressure drop may also cause the limit to trip more frequently during the winter and the indoor coil to freeze in the summer, resulting in an increase in the number of service calls.

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate Lennox Product Specifications bulletin. Additional information is provided in Service and Application Note ACC002 (August 2000).

- 4 - Check the condition and cleanliness of burners and heat exchanger and clean if necessary.
- 5 - Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary . The blower motors are prelubricated for extended bearing life. No further lubrication is needed.
- 6 - Inspect the combustion air inducer and clean if necessary.

- 7 - Evaluate the heat exchanger integrity by inspecting the heat exchanger per the AHRI heat exchanger inspection procedure. This procedure can be viewed at www.ahrinet.org.
- 8 - Ensure sufficient combustion air is available to the furnace. Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) must be properly sized, open and unobstructed to provide combustion air.
- 9 - Inspect the furnace venting system to make sure it is in place, structurally sound, and without holes, corrosion, or blockage. Vent system must be free and clear of obstructions and must slope upward away from the furnace . Vent system should be installed per the National Fuel Gas Code
- 10 - Inspect the furnace return air duct connection to ensure the duct is sealed to the furnace. Check for air leaks on supply and return ducts and seal where necessary.
- 11 - Check the condition of the furnace cabinet insulation and repair if necessary.
- 12 - Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.
- 13 - Verify operation of CO detectors and replace batteries as required.

Perform a general system test. Turn on the furnace to check operating functions such as the start-up and shut-off operation.

- 1 - Check the operation of the ignition system, inspect and clean flame sensor. Check microamps before and after. Check controls and safety devices (gas valve, flame sensor, temperature limits). Consult Service Manual for proper operating range. Thermal Limits should be checked by restricting airflow and not disconnecting the indoor blower. For additional details, please see Service and Application Note H049.
- 2 - Verify that system total static pressure and airflow settings are within specific operating parameters.
- 3 - Clock gas meter to ensure that the unit is operating at the specified firing rate. Check the supply pressure and the manifold pressure. On two-stage gas furnaces check the manifold pressure on high fire and low fire. If manifold pressure adjustment is necessary, consult the Service Literature for unit specific information on adjusting gas pressure. Not all gas valves are adjustable. Verify correct temperature rise.

A-Heat Exchanger and Burners

Cleaning the Heat Exchanger and Burners

NOTE - Use papers or protective covering in front of the furnace during cleaning.

- 1 - Turn off both electrical and gas power supplies to furnace.
- 2 - Remove flue pipe, top cap, flue chase and internal flue pipe assembly from the unit.
- 3 - Label the wires from gas valve, rollout switches, primary limit switch and make-up box then disconnect them.
- 4 - Remove the screws that secure the combustion air inducer pressure switch assembly to the collector box. Carefully remove the combustion air inducer to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage.
- 5 - Remove the collector box located behind the combustion air inducer. Be careful with the collector box gasket. If the gasket is damaged, it must be replaced to prevent leakage.
- 6 - Disconnect gas supply piping. Remove the screw securing the burner box cover and remove cover. Remove the four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.
- 7 - Remove screws securing burner box and remove burner box.
- 8 - Remove screws from both sides, top and bottom of vestibule panel.
- 9 - Remove heat exchanger. It may be necessary to spread cabinet side to allow more room. If so, remove five screws from the left side or right side of cabinet. See FIGURE 22.

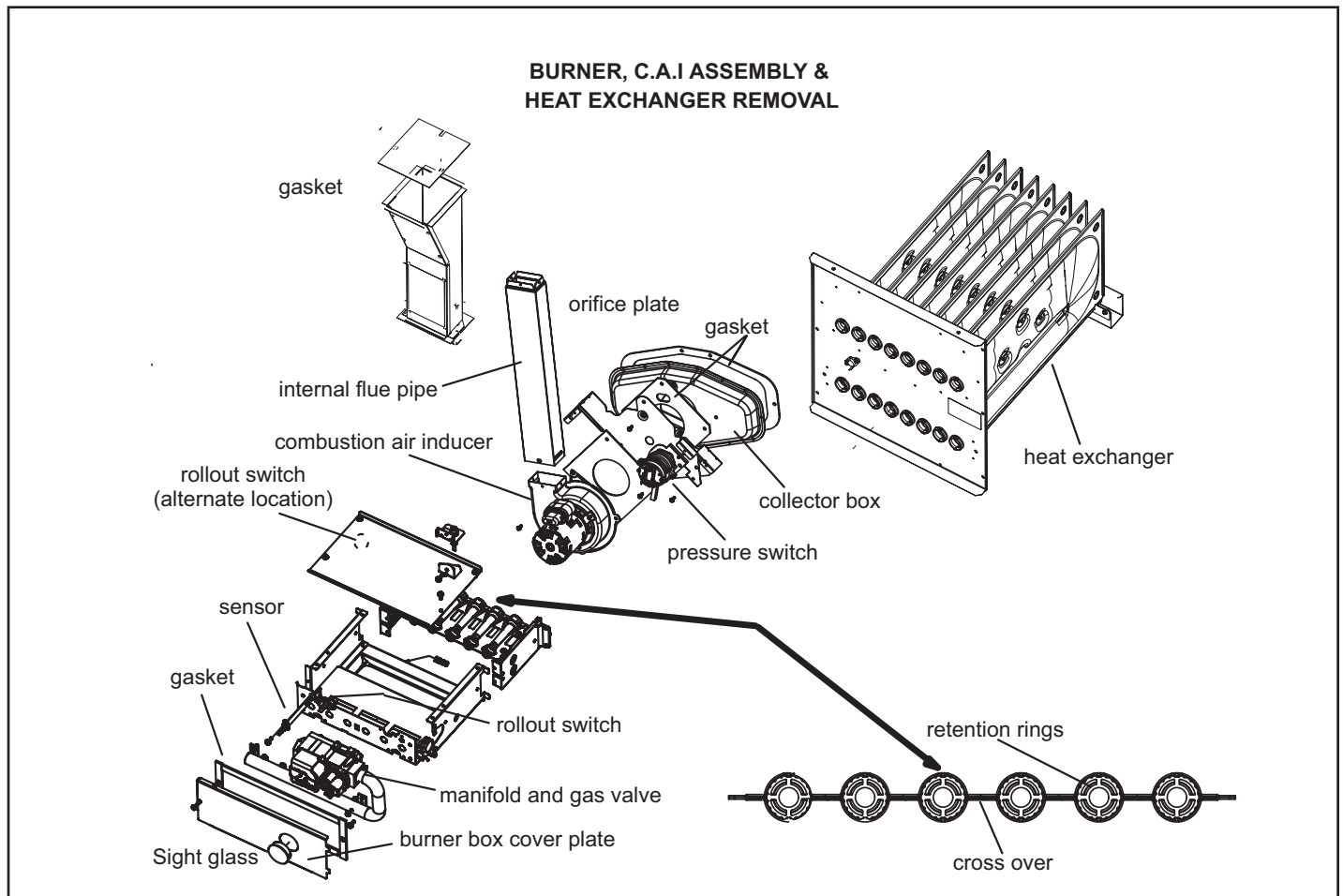


FIGURE 21

- 10 - Back wash using steam. Begin from the burner opening on each clam. Steam must not exceed 275°F.
- 11 - To clean burners, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage. FIGURE 21 shows burner detail.
- 12 - To clean the combustion air inducer visually inspect and using a wire brush clean where necessary. Use compressed air to clean off debris and any rust.
- 13 - Reinstall heat exchanger in vestibule. (Replace the five screws in the cabinet from step 10 if removed).
- 14 - Reinstall collector box, combustion air assembly, internal flue pipe and flue chase. Seal with high temperature RTV. Reinstall all screws to the collector box and combustion air inducer. Failure to replace all screws may cause leaks. Inspect gaskets for any damage and replace if necessary.
- 15 - Reinstall burner box, manifold assembly and burner box cover.
- 16 - Reconnect all wires.
- 17 - Reconnect top cap and vent pipe to combustion air inducer outlet.
- 18 - Reconnect gas supply piping.
- 19 - Turn on power and gas supply to unit.
- 20 - Set thermostat and check for proper operation.
- 21 - Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.

- 22 - If a leak is detected, shut gas and electricity off and repair leak.
- 23 - Repeat steps 21 and 23 until no leaks are detected.
- 24 - Replace access panel

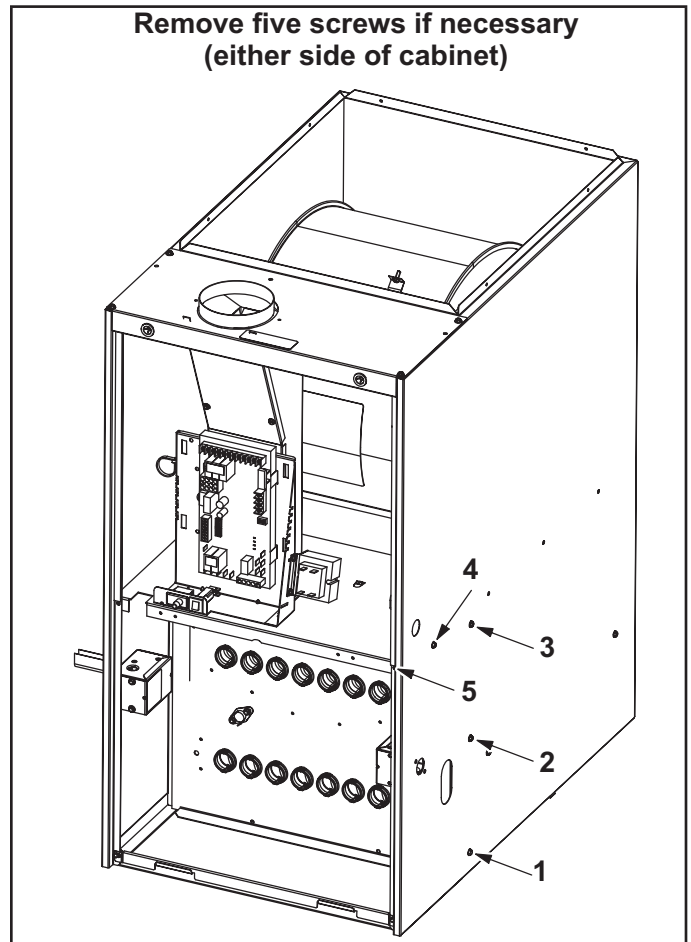


FIGURE 22

VII- Wiring and Sequence of Operation Integrated Control Self Check

When there is a call for heat, the integrated control runs a self check. The control checks for S10 primary limit, S21 secondary limit (s) and S47 rollout switch normally closed contacts. The control also checks for S102 high heat and S128 low heat prove switch normally open contacts. Once self check is complete and all safety switches are operational, heat call can continue.

NOTE - The ignition control thermostat selection DIP switch is factory-set in the "TWO-STAGE" position.

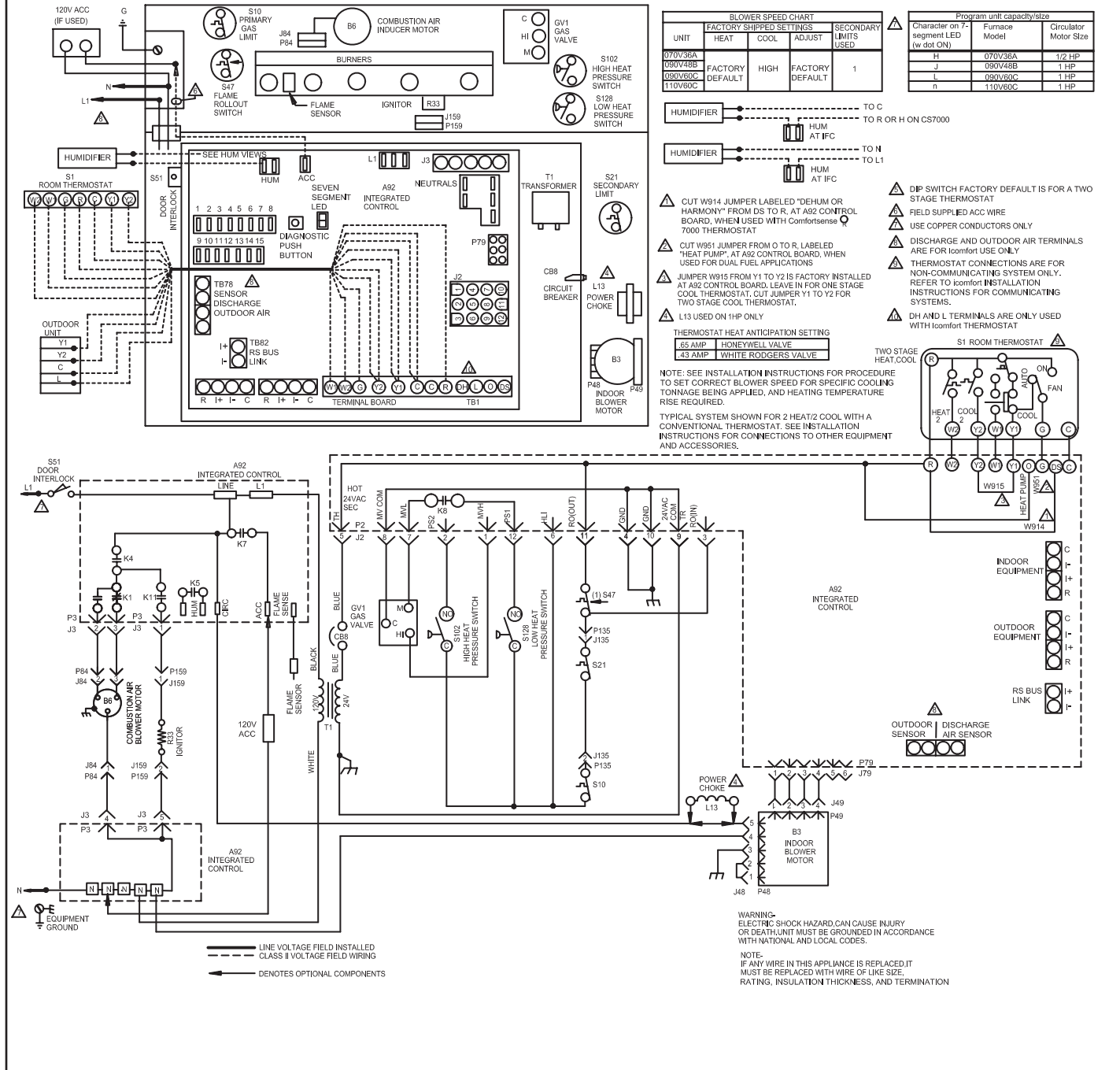
CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

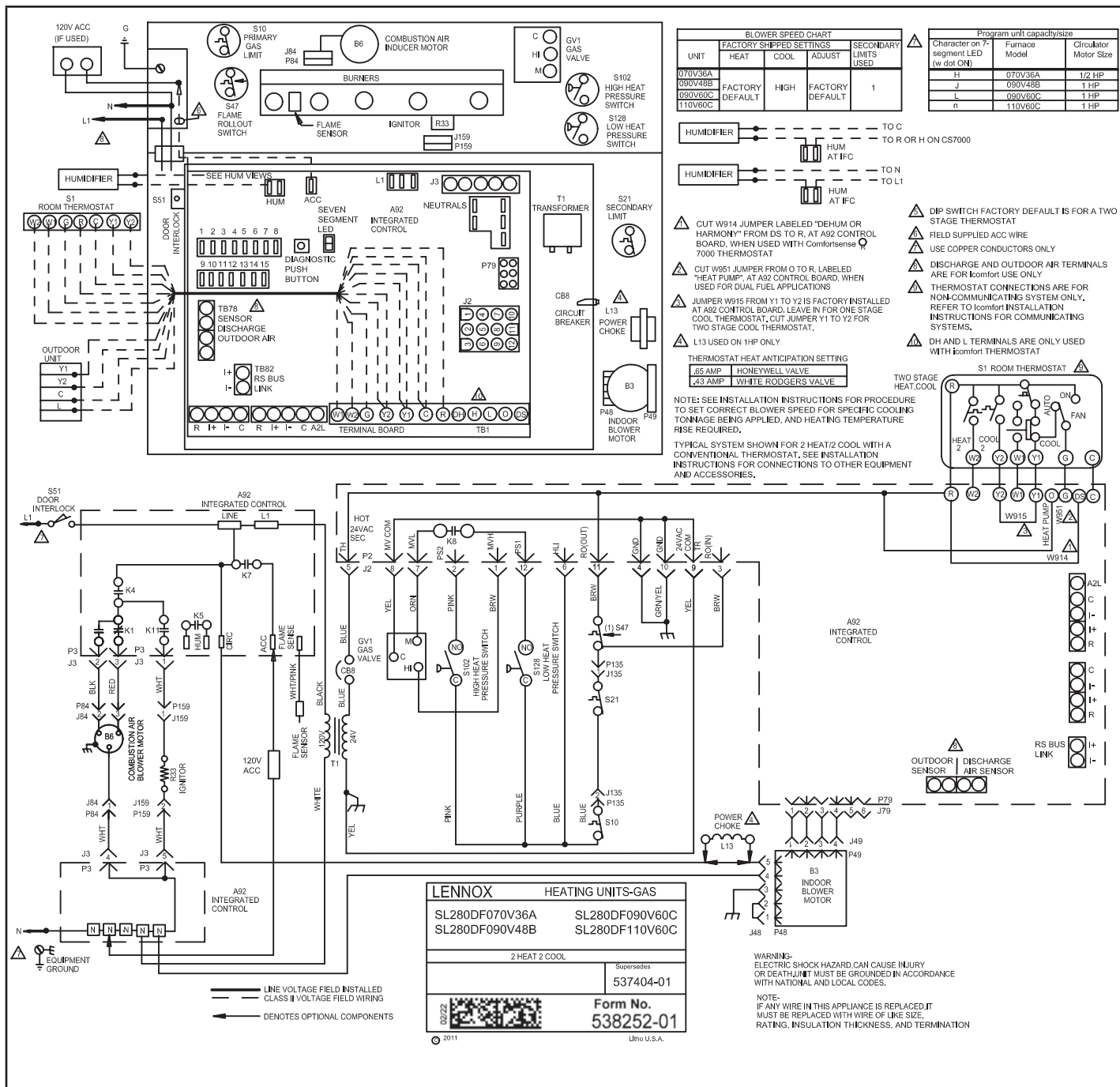
VII- Wiring and Sequence of Operation

Wiring Diagram With Ignition Control 103130-XX

SL280DFV Schematic Wiring Diagram



Wiring Diagram With Ignition Control 107045-XX



Applications Using a Two-Stage Thermostat

A - Heating Sequence -- Integrated Control Thermostat Selection DIP Switch 1 OFF in "Two-Stage" Position (Factory Setting)

- 1 - On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed.

- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.

NOTE - *If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed, the HUM contacts close energizing the humidifier and 120V ACC terminal is energized. The furnace will continue this operation as long as the thermostat has a first-stage heating demand.

NOTE - *If the indoor thermostat is set on CONTINUOUS FAN ON mode, the furnace will light on high fire (second-stage) for 60 seconds to improve heat exchanger warm up. After 60 second warm-up period, furnace will switch to low fire (first-stage).*

- 5 - If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.
- 6 - At the end of the recognition delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
- 7 - When the demand for high fire (second stage) heat is satisfied, the combustion air inducer is switched to the low-fire heating speed and the high-fire (second stage) gas valve is de-energized. The low-fire (first stage) gas valve continues operation. The indoor blower motor is switched to the low-fire heating speed.
- 8 - When the thermostat demand for low-fire (first stage) heat is satisfied, the gas valve is de-energized and the field-selected indoor blower off delay begins. The combustion air inducer begins a 5-second post-purge period.

- 9 - When the combustion air post-purge period is complete, the inducer, the HUM contacts as well as the 120V ACC terminals are de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using A Single-Stage Thermostat

B - Heating Sequence -- Integrated Control Thermostat Selection DIP Switch 1 ON in "Single-Stage" Position

NOTE - *In these applications, two-stage heat will be initiated by the integrated control if heating demand has not been satisfied after the field adjustable period (7 or 12 minutes).*

- 1 - On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed.

- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.

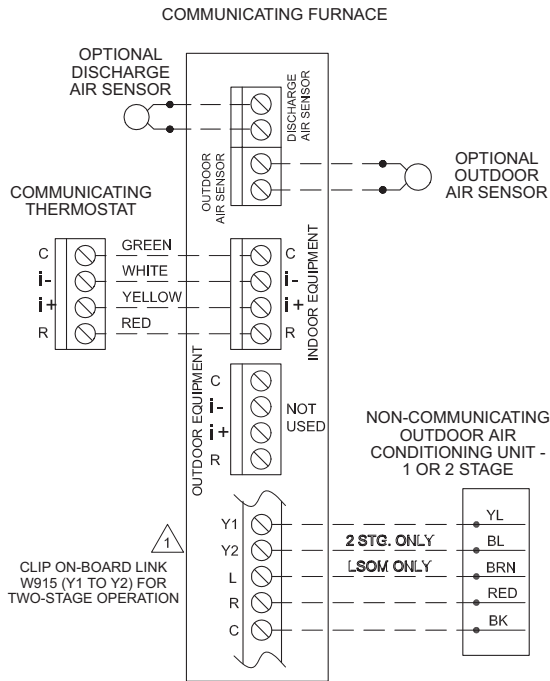
NOTE - *If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed and the HUM contacts are energized. The integrated control also initiates a second-stage on delay (factory-set at 7 minutes; adjustable to 12 minutes).
- 5 - If the heating demand continues beyond the secondstage on delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
- 6 - When the thermostat heating demand is satisfied, the combustion air inducer begins a 5-second low speed post-purge. The field-selected indoor blower off delay begins. The indoor blower operates at the low-fire heating speed.
- 7 - When the combustion air post-purge period is complete, the inducer, the HUM contacts as well as the 120V ACC terminals are de-energized. The indoor blower is de-energized at the end of the off delay.

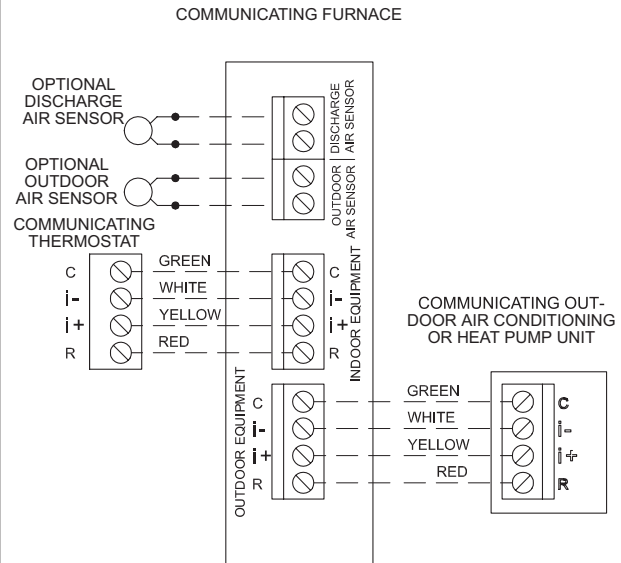
VIII- Field Wiring With Conventional and Communicating Enabled Thermostat With Ignition

Ignition Control 103130-XX

Communicating Enabled Furnace and Non-Communicating Outdoor Unit

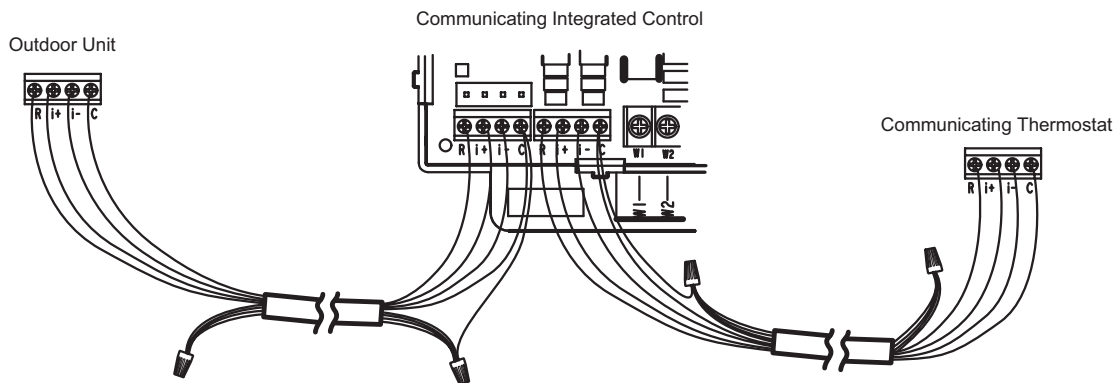


Communicating Enabled Furnace and Communicating Enabled Outdoor Unit



Communicating systems four thermostat wires between the thermostat and the furnace/air handler control and four wires between the outdoor unit and the furnace/air handler control. When a thermostat cable with more than four wires is used, the extra wires must be properly connected to avoid electrical noise. The wires must not be left disconnected.

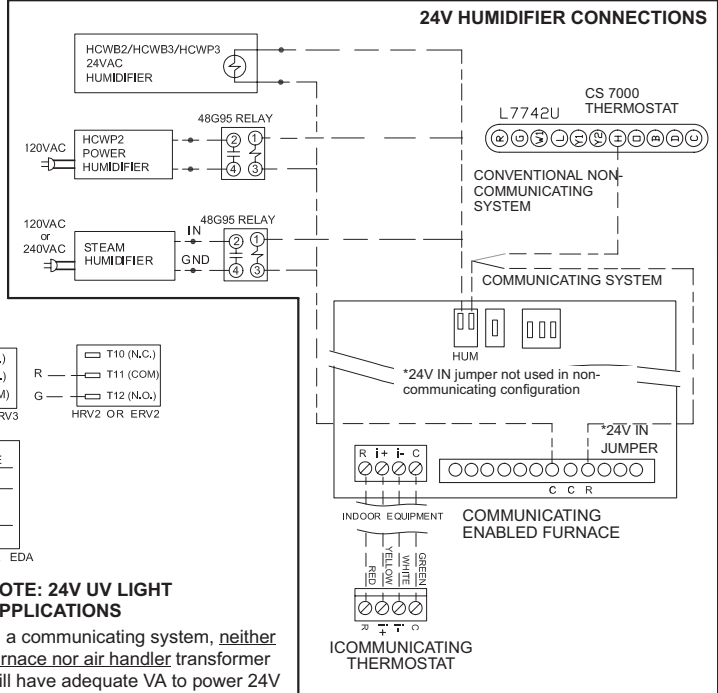
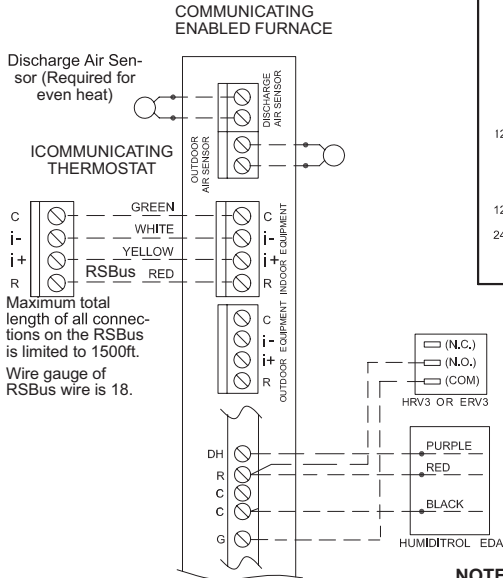
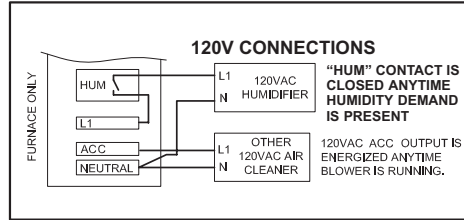
Use wire nuts to bundle the four unused wires at each end of the cable. A single wire should then be connected to the indoor unit end of the wire bundle and attached to the "C" terminals as shown below.



Optional Accessories for use with any Communicating System

NOTE: ICOMMUNICATING THERMOSTAT SENSES HUMIDITY & CONTROLS HUM CONTACTS TO CYCLE HUMIDIFIER BASED ON DEMAND. NO OTHER CONTROL OR HUMIDISTAT REQUIRED.

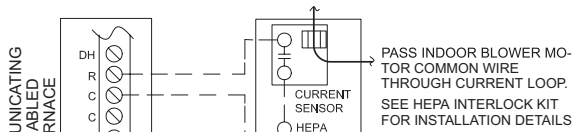
OPTIONAL OUTDOOR AIR SENSOR FOR USE WITH HUMIDIFIER IF NOT ALREADY IN THE SYSTEM FOR OTHER FUNCTIONS. BUILT INTO ALL COMMUNICATING ENABLED OUT DOOR UNITS).



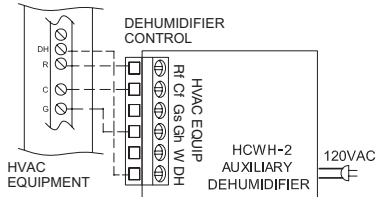
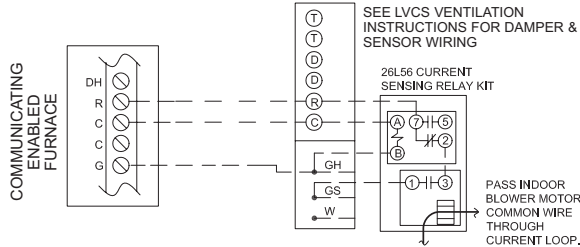
NOTE: 24V UV LIGHT APPLICATIONS

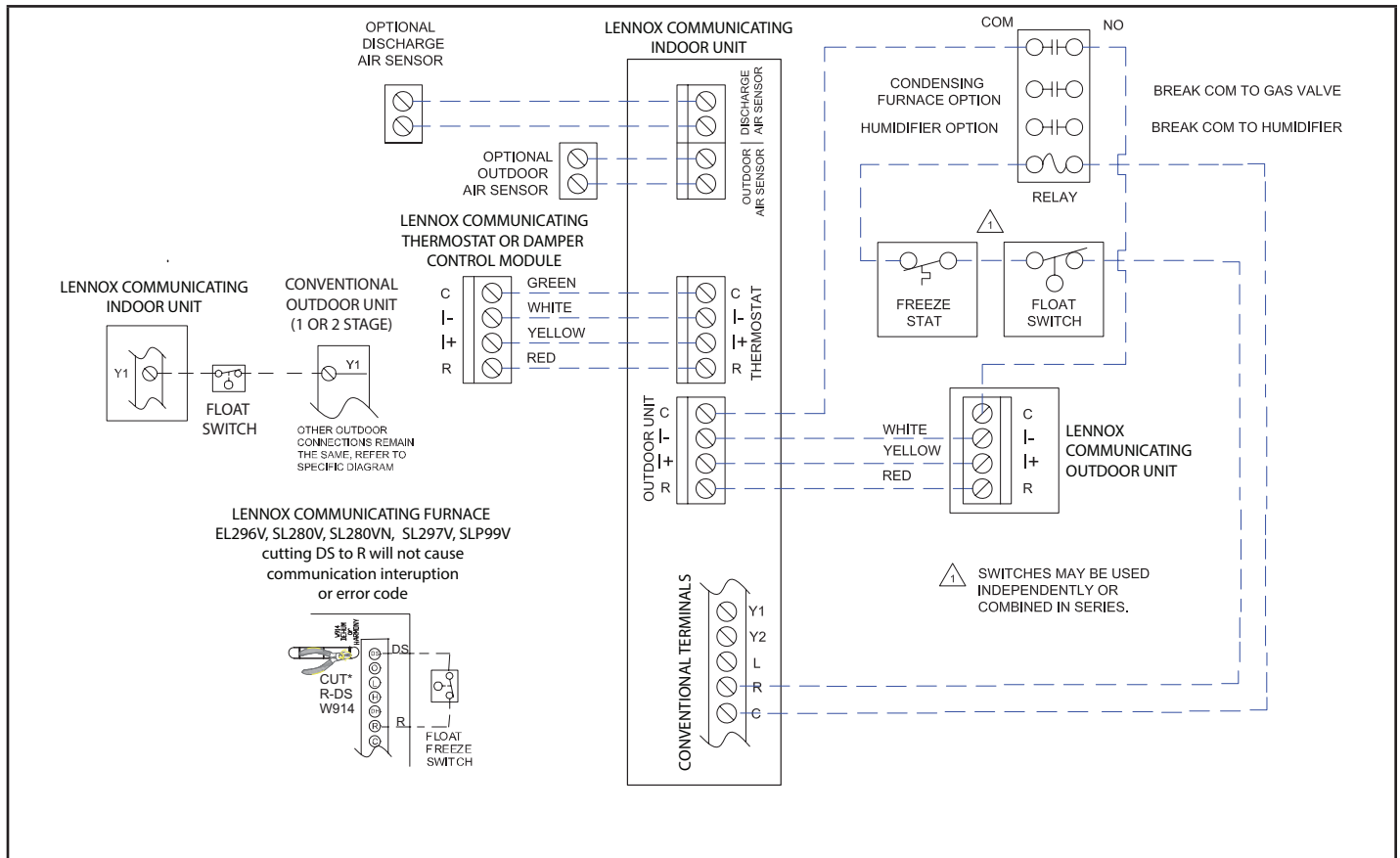
In a communicating system, neither furnace nor air handler transformer will have adequate VA to power 24V UV light applications. An additional transformer for UV light applications is required.

HEPA BYPASS FILTER X2680 HEPA INTERLOCK KIT

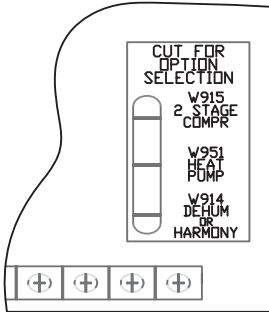
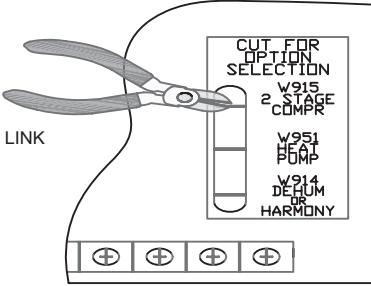
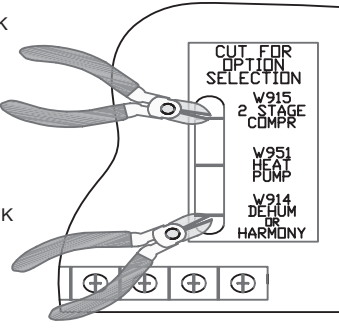


LVCS VENTILATION CONTROL SYSTEM



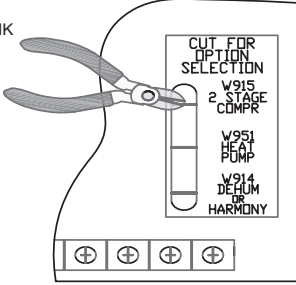
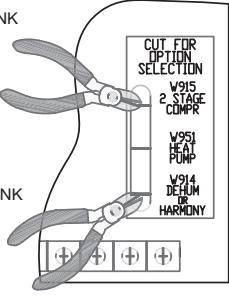
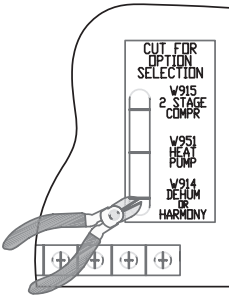
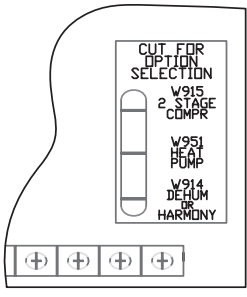


Ignition Control 103130-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																														
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1 Heat / 2 Cool with t'stat with humidity control <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	<table border="0"> <tr> <td>S1 T'STAT</td> <td>FURNACE TERM. STRIP</td> <td>OUTDOOR UNIT</td> </tr> <tr> <td>(DS) -----</td> <td>(DS)</td> <td></td> </tr> <tr> <td></td> <td>(W2)</td> <td></td> </tr> <tr> <td>(W1) -----</td> <td>(W1)</td> <td></td> </tr> <tr> <td>(R) -----</td> <td>(R)</td> <td>* --- (R)</td> </tr> <tr> <td>(G) -----</td> <td>(G)</td> <td></td> </tr> <tr> <td>(C) -----</td> <td>(C)</td> <td>--- (C)</td> </tr> <tr> <td>(Y2) -----</td> <td>(Y2)</td> <td>--- (Y2)</td> </tr> <tr> <td>(Y1) -----</td> <td>(Y1)</td> <td>--- (Y1)</td> </tr> <tr> <td></td> <td>(O)</td> <td></td> </tr> </table>	S1 T'STAT	FURNACE TERM. STRIP	OUTDOOR UNIT	(DS) -----	(DS)			(W2)		(W1) -----	(W1)		(R) -----	(R)	* --- (R)	(G) -----	(G)		(C) -----	(C)	--- (C)	(Y2) -----	(Y2)	--- (Y2)	(Y1) -----	(Y1)	--- (Y1)		(O)	
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Ignition Control 103130-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																														
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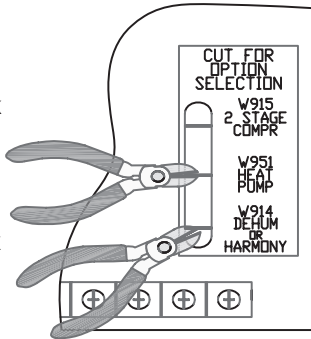
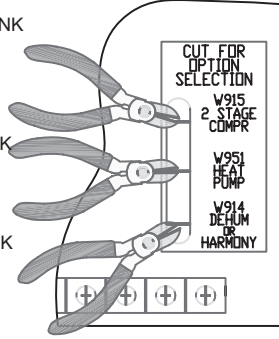
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* Connect W1 to W1 ONLY if using defrost tempering kit 67M41

NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

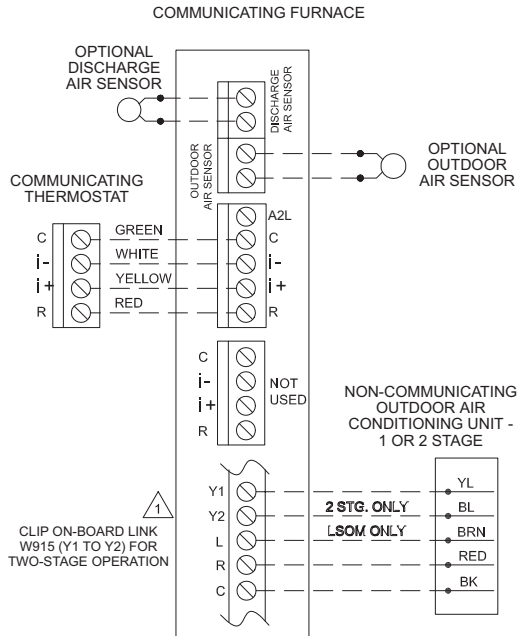
Ignition Control 103130-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																																													
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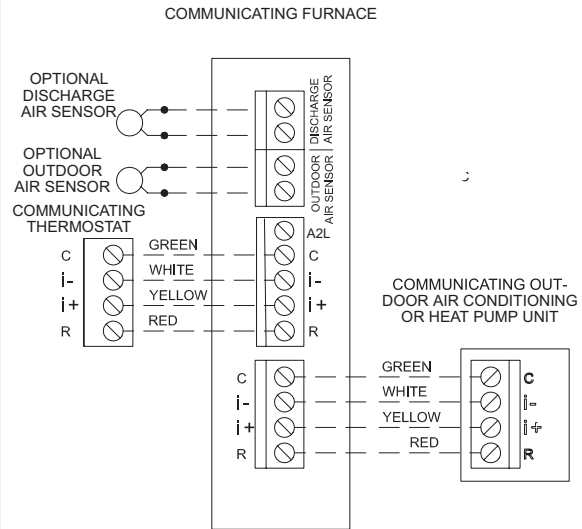
* Connect W1 to W1 ONLY if using defrost tempering kit 67M41

NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

Communicating Enabled Furnace and Non-Communicating Outdoor Unit



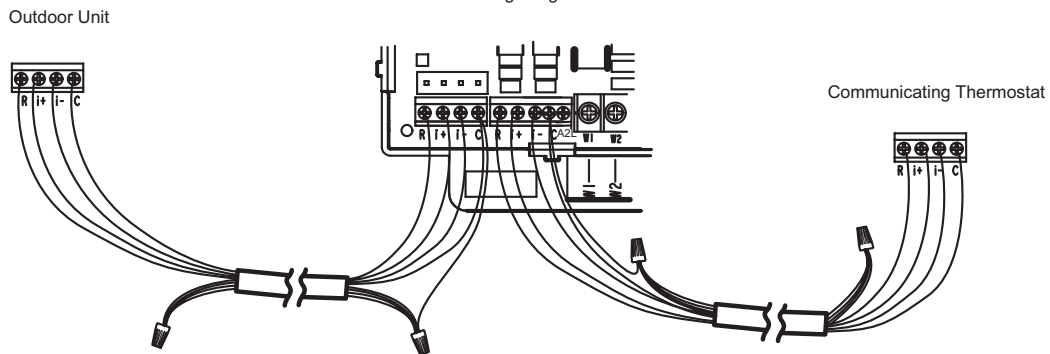
Communicating Enabled Furnace and Communicating Enabled Outdoor Unit



Communicating systems four thermostat wires between the thermostat and the furnace/air handler control and four wires between the outdoor unit and the furnace/air handler control. When a thermostat cable with more than four wires is used, the extra wires must be properly connected to avoid electrical noise. The wires must not be left disconnected.

Use wire nuts to bundle the four unused wires at each end of the cable. A single wire should then be connected to the indoor unit end of the wire bundle and attached to the "C" terminals as shown below.

Communicating Integrated Control

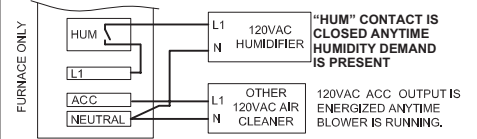


Optional Accessories for use with Communicating System

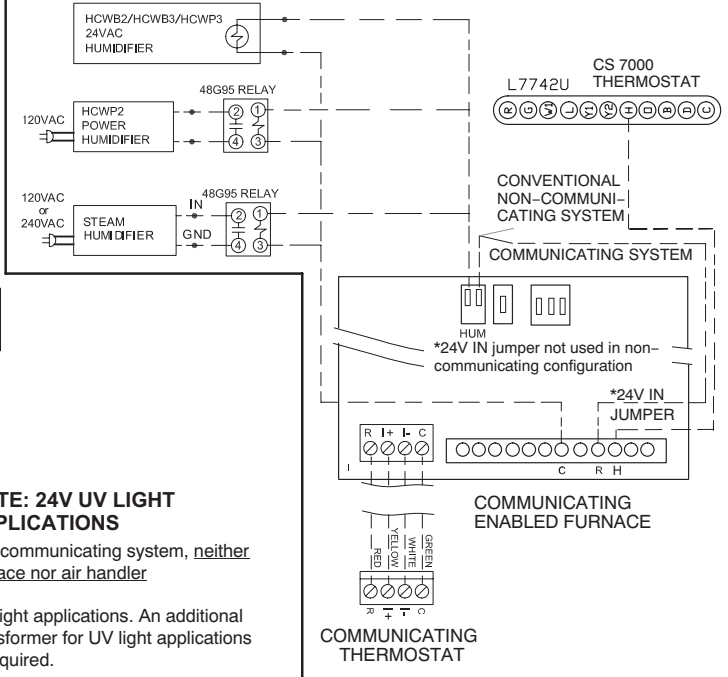
NOTE: COMMUNICATING THERMOSTAT SENSES HUMIDITY & CONTROLS HUM CONTACTS TO CYCLE HUMIDIFIER BASED ON DEMAND. NO OTHER CONTROL OR HUMIDISTAT REQUIRED.

OPTIONAL OUTDOOR AIR SENSOR FOR USE WITH HUMIDIFIER (IF NOT ALREADY IN THE SYSTEM FOR OTHER FUNCTIONS. BUILT INTO ALL COMMUNICATING ENABLED OUTDOOR UNITS).

120V CONNECTIONS



24V HUMIDIFIER CONNECTIONS

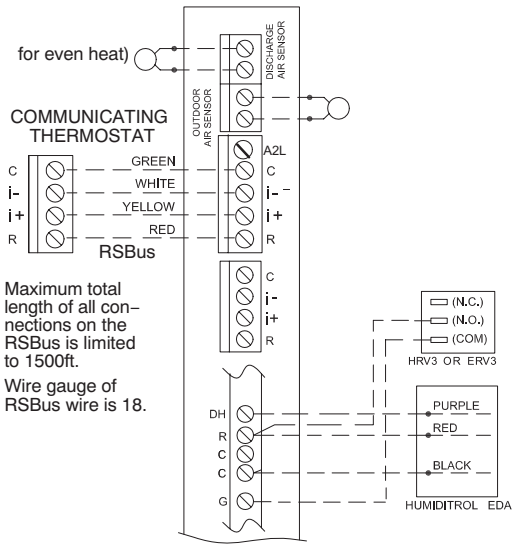


NOTE: 24V UV LIGHT APPLICATIONS

In a communicating system, neither furnace nor air handler

UV light applications. An additional transformer for UV light applications is required.

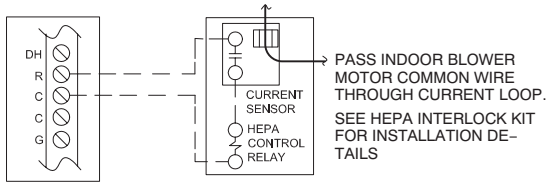
COMMUNICATING ENABLED FURNACE



Maximum total length of all connections on the RSBUS is limited to 1500ft.
Wire gauge of RSBUS wire is 18.

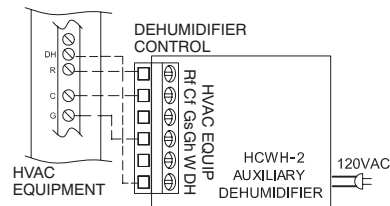
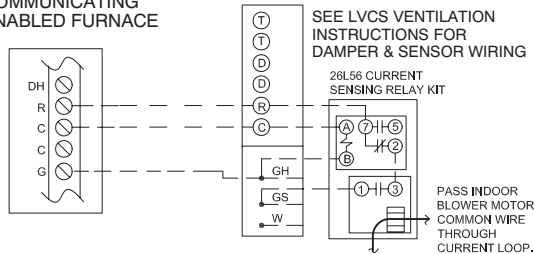
HEPA BYPASS FILTER X2680 HEPA INTERLOCK KIT

COMMUNICATING ENABLED FURNACE

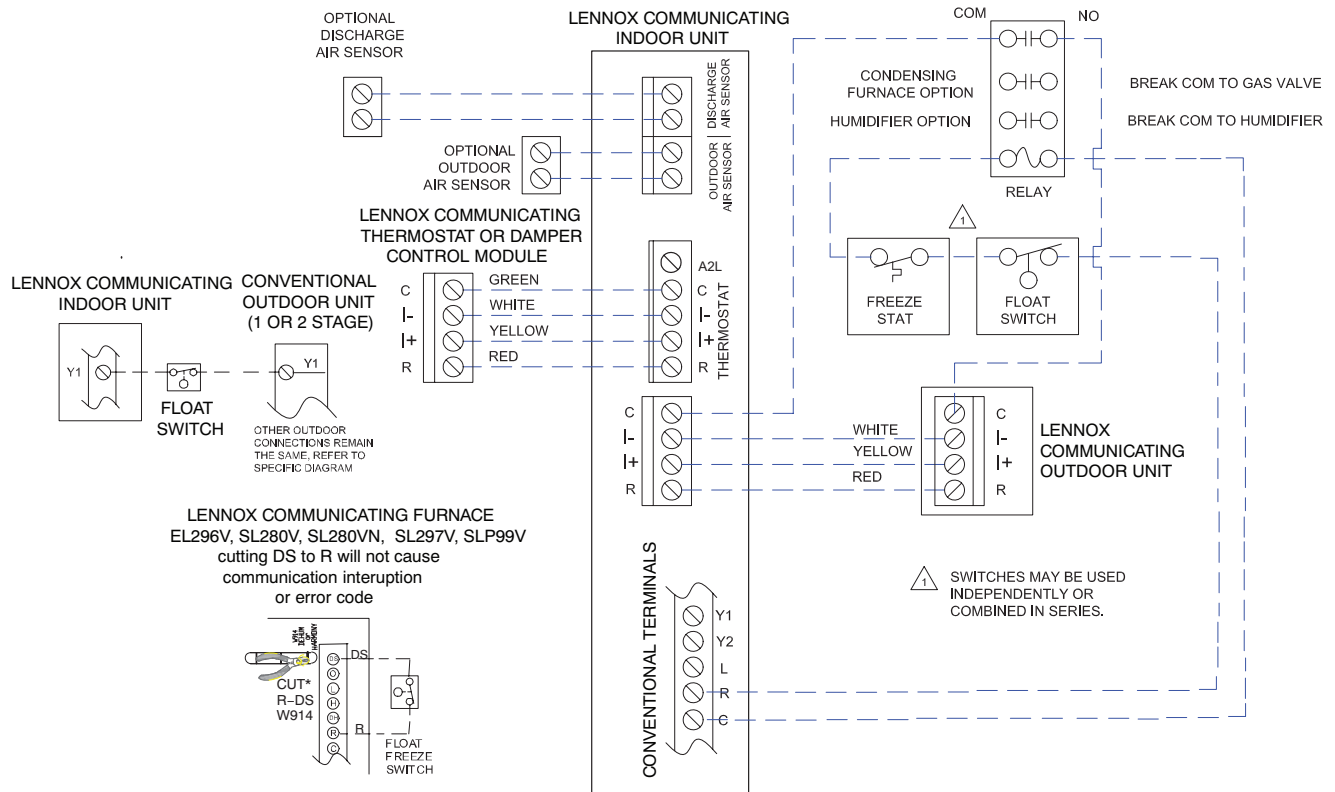


LVCS VENTILATION CONTROL SYSTEM

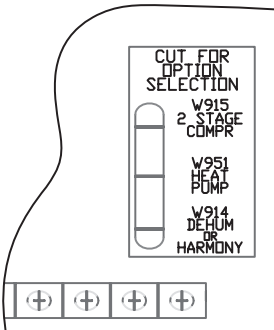
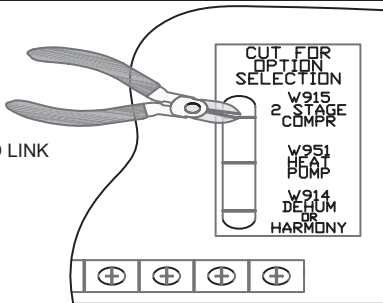
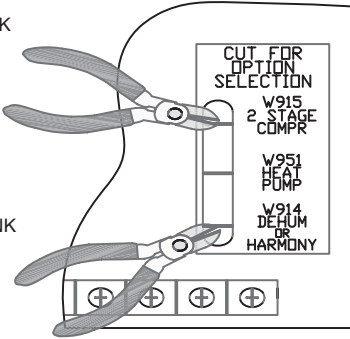
COMMUNICATING ENABLED FURNACE



Optional Accessories With Communicating System

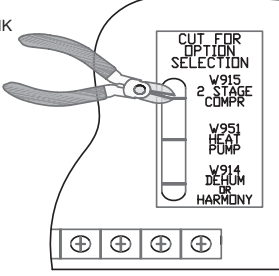
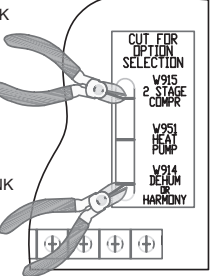
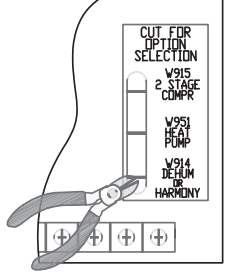
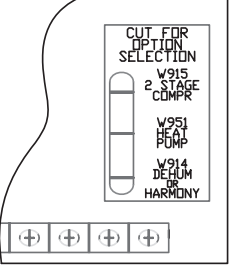


Ignition Control 107045-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																																	
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options																																		
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1 Heat / 2 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR 	<table border="0"> <tr> <td>S1 T'STAT</td> <td>FURNACE TERM. STRIP</td> <td>OUTDOOR UNIT</td> </tr> <tr> <td></td> <td>(DS)</td> <td></td> </tr> <tr> <td></td> <td>(H)</td> <td></td> </tr> <tr> <td></td> <td>(W2)</td> <td></td> </tr> <tr> <td>(W)-----</td> <td>(W1)</td> <td></td> </tr> <tr> <td>(R)-----</td> <td>(R)</td> <td>*----- (R)</td> </tr> <tr> <td>(G)-----</td> <td>(G)</td> <td></td> </tr> <tr> <td>(C)-----</td> <td>(C)</td> <td>----- (C)</td> </tr> <tr> <td>(Y2)-----</td> <td>(Y2)</td> <td>----- (Y2)</td> </tr> <tr> <td>(Y1)-----</td> <td>(Y1)</td> <td>----- (Y1)</td> </tr> <tr> <td></td> <td>(O)</td> <td></td> </tr> </table>	S1 T'STAT	FURNACE TERM. STRIP	OUTDOOR UNIT		(DS)			(H)			(W2)		(W)-----	(W1)		(R)-----	(R)	*----- (R)	(G)-----	(G)		(C)-----	(C)	----- (C)	(Y2)-----	(Y2)	----- (Y2)	(Y1)-----	(Y1)	----- (Y1)		(O)	
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* Not required on all units.

Ignition Control 107045-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

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* Not required on all units.

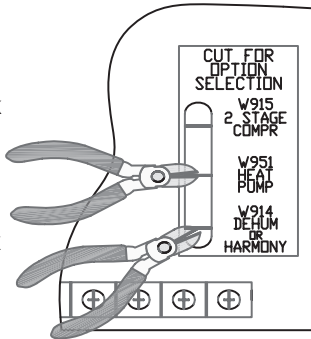
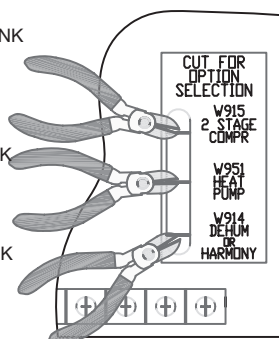
Ignition Control 107045-XX DIP Switch Settings and On-Board Links With a Conventional Thermostat

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
<p>Dual Fuel Single Stage Heat Pump</p> <p>ComfortSense thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control</p>	OFF	<p>CUT ON-BOARD LINK W951 HEAT PUMP</p>	<p>L7742U T'STAT FURNACE TERM. STRIP HEAT PUMP</p> <p>R --- R R --- R</p> <p>H --- H H --- H</p> <p>W2 --- W2 W2 --- W2 67M41*</p> <p>W1 --- W1 ← 67M41* → W1</p> <p>O --- O O --- O</p> <p>L --- L L --- L</p> <p>Y1 --- Y1 Y1 --- Y1</p> <p>Y2 --- Y2 Y2 --- Y2</p> <p>G --- G G --- G</p> <p>D --- D D --- D</p> <p>B --- B B --- B</p> <p>C --- C C --- C</p> <p>T --- T T --- T</p> <p>T --- T T --- T</p> <p>outdoor sensor</p>
<p>Dual Fuel Two Stage Heat Pump</p> <p>ComfortSense thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control</p>	OFF	<p>CUT ON-BOARD LINK W915 2 STAGE COMPR</p> <p>CUT ON-BOARD LINK W951 HEAT PUMP</p>	<p>L7742U T'STAT FURNACE TERM. STRIP HEAT PUMP</p> <p>R --- R R --- R</p> <p>H --- H H --- H</p> <p>W2 --- W2 W2 --- W2 67M41*</p> <p>W1 --- W1 ← 67M41* → W1</p> <p>O --- O O --- O</p> <p>L --- L L --- L</p> <p>Y1 --- Y1 Y1 --- Y1</p> <p>Y2 --- Y2 Y2 --- Y2</p> <p>G --- G G --- G</p> <p>D --- D D --- D</p> <p>B --- B B --- B</p> <p>C --- C C --- C</p> <p>T --- T T --- T</p> <p>T --- T T --- T</p> <p>Y2 out blue</p> <p>outdoor sensor</p>

* Connect W1 to W1 ONLY if using defrost tempering kit 67M41

NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

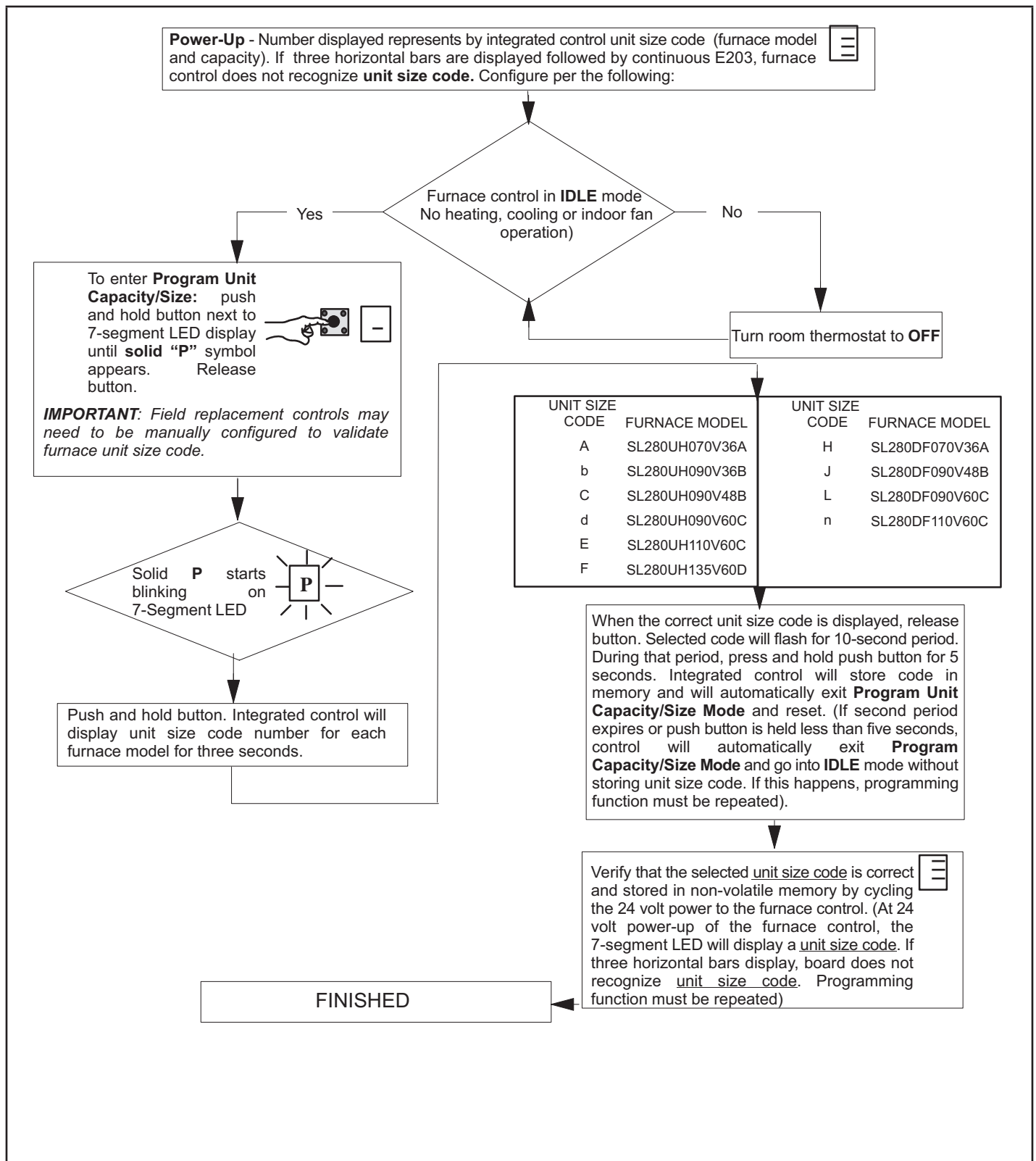
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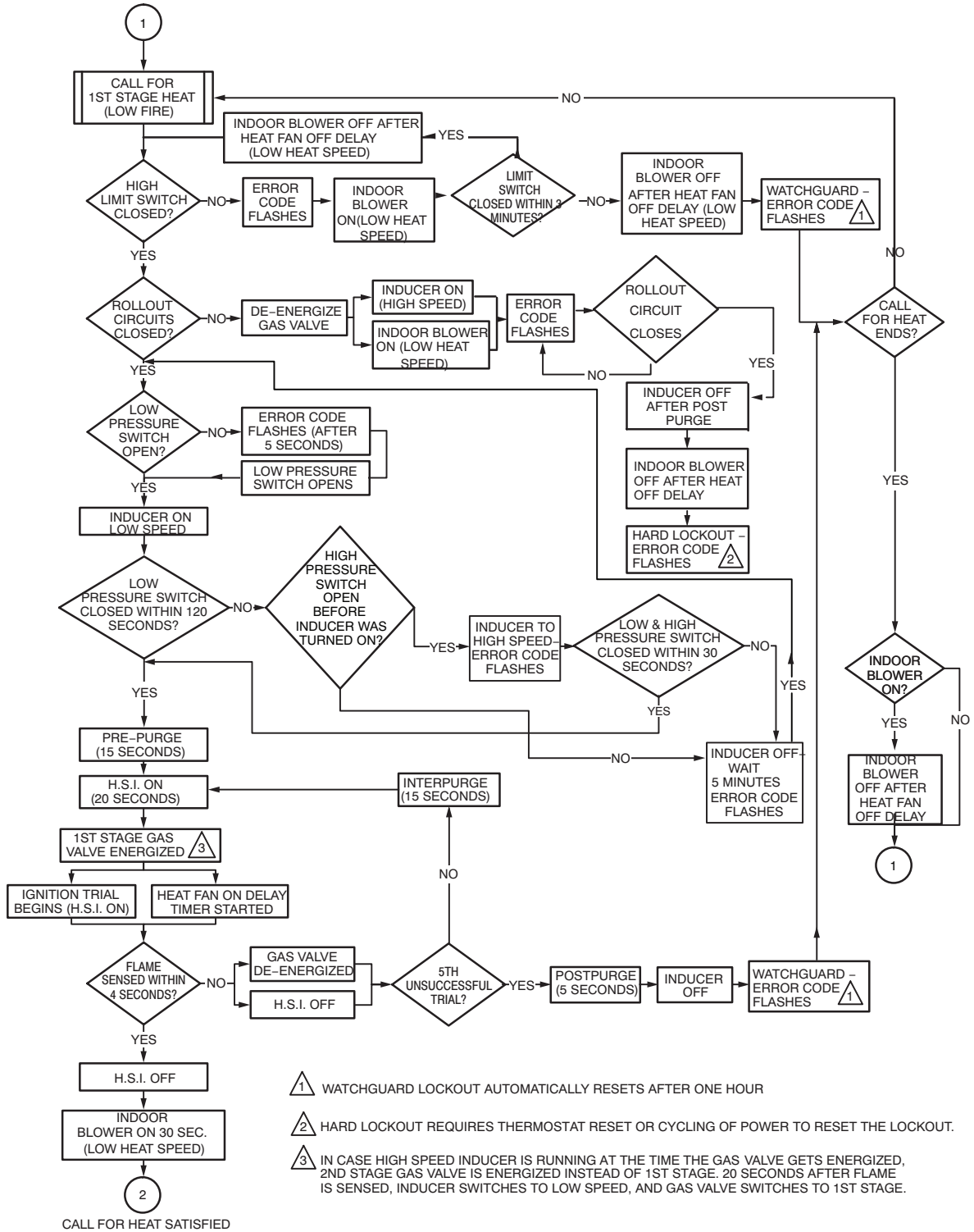
NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the integrated control.

IX- Program Unit Capacity Size Mode

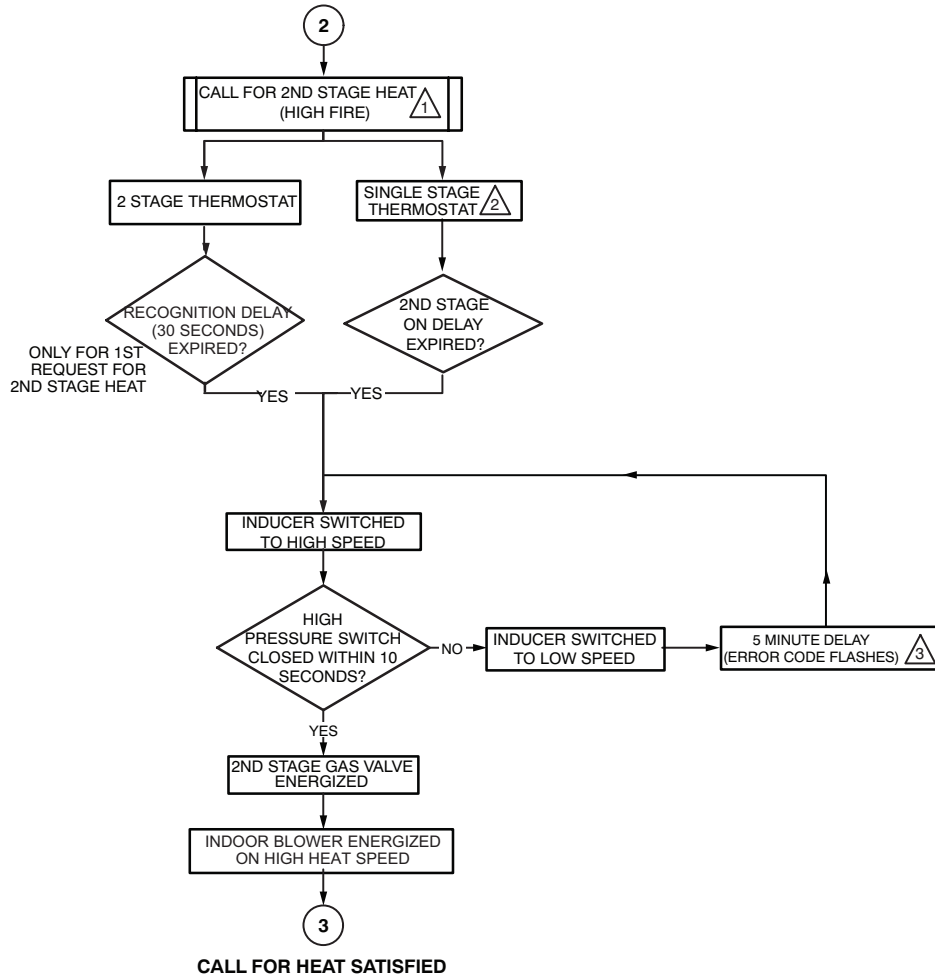


X- Troubleshooting

CALL FOR FIRST-STAGE HEAT



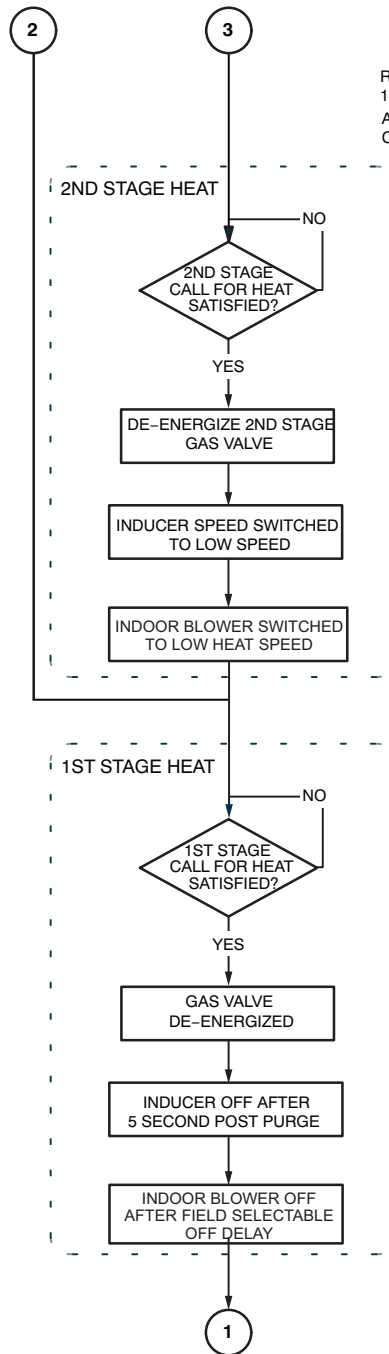
CALL FOR SECOND-STAGE HEAT



- 1 SYSTEM WILL ALWAYS LIGHT ON LOW FIRE, EVEN IF 2ND STAGE HEAT IS IN PLACE.
- 2 WHEN USED WITH A SINGLE STAGE THERMOSTAT, SET SW1 TO THE ON POSITION IN DIP SWITCH S4.
- 3 IF THE HIGH FIRE PRESSURE SWITCH DOES NOT CLOSE WITHIN 5 ATTEMPTS, THE SYSTEM WILL OPERATE AT LOW FIRE FOR THE REMAINDER OF THE CALL FOR HEAT REQUEST.

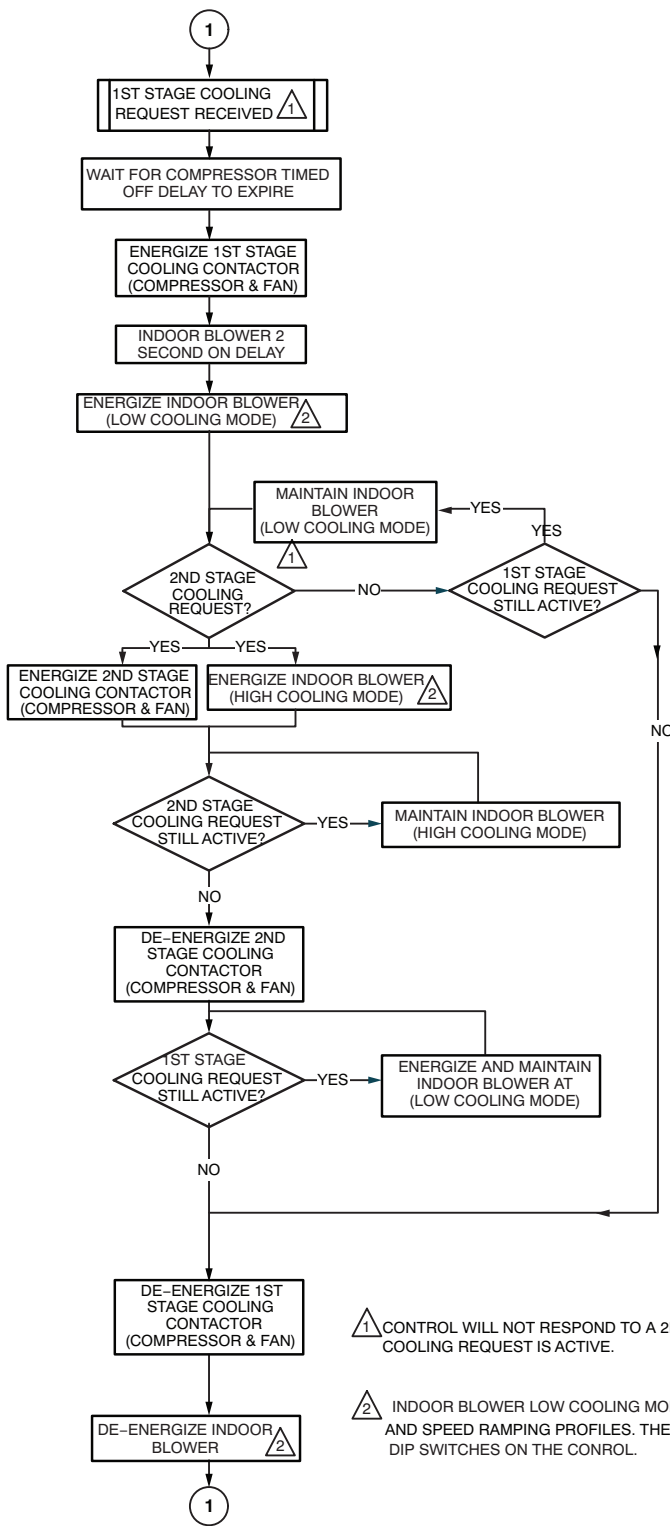
CALL FOR HEAT SATISFIED

FIRST-STAGE HEAT SECOND-STAGE HEAT



RUN MODE:
1ST OR 2ND STAGE CALL FOR HEAT.
ALL INPUTS MONITORED (LIMIT, PRESSURE,
CALL FOR HEAT/COOL, FLAME LEVEL)

CALL FOR COOLING



1 CONTROL WILL NOT RESPOND TO A 2ND STAGE COOLING REQUEST UNLESS A 1ST STAGE COOLING REQUEST IS ACTIVE.

2 INDOOR BLOWER LOW COOLING MODE AND HIGH COOLING MODE HAVE SPECIFIC ON, OFF AND SPEED RAMPING PROFILES. THE SPECIFIC PROFILE IS SELECTED USING THE DIP SWITCHES ON THE CONTROL.

CALL FOR FAN

